Barking, Havering and Redbridge University Hospitals NHS Trust

DRUG NAME: Vitamin D (ergocalciferol; colecalciferol)
Indication/s: For the treatment of symptomatic vitamin D deficiency in infants, children and adolescents

DOCUMENT TO BE SCANNED INTO ELECTRONIC RECORDS AS AND FILED IN NOTES

Patient Name: **Date of Birth:** **NHS No:**

Name of Referring Consultant: **Contact number:**

INTRODUCTION AND BACKGROUND

Vitamin D deficiency is common in our paediatric population. Exclusively breast-fed infants above the age of 6 months are at high risk particularly if their mothers are vitamin D deficient and the infants are not established on wide range of solid foods. Adolescents who have a poor diet and/or have limited sun exposure due to clothing are also vulnerable.(1,2,3,4)
There has been an increased awareness of the association between vitamin D and health in young children (5)

PATIENT PATHWAY-

Developing guidance for managing vitamin D deficiency has been complicated by the following factors:

- there is a lack of consensus regarding the ideal level of vitamin D and optimum serum concentrations
- the evidence base is not completely defined in relation to the best management of different vitamin D deficiency states and the monitoring required following treatment
- the availability of licensed vitamin D products is limited and unlicensed products have variable and often substantial costs

The majority of cases of vitamin D deficiency can be treated and prevented in primary care. The purpose of this guideline is to harmonise practice with regard to the identification, treatment and monitoring of symptomatic vitamin D deficiency across the sector and to maximise resources by focusing treatment on those patients who have or are at most risk from vitamin D deficiency related disease. The products listed within this guideline represent the best choices in terms of quality, availability and cost. The preparation prescribed in the secondary care may vary from the one that will be prescribed in the primary care but it is expected that they will be of equivalent efficacy.

Indication	Prescribing Initiated by	Prescribing Continued by :	Monitored by :	Duration of treatment
Vitamin D deficiency	Consultant Paediatrician	General Practitioner	Consultant and GP	Dependent on diagnosis and risk factors (see below)

RISK FACTORS FOR VITAMIN D DEFICIENCY

Sunlight is the most important source of vitamin D, however, in the UK it is not possible for everyone to get enough vitamin D from sunlight exposure alone. Risk factors for vitamin D deficiency in children include:

- Infants who are exclusively breastfed, especially if the mother is also at risk of vitamin D deficiency
- Pigmented skin
- Adolescents on poor diet or those who have limited exposure to the sun
- Children and adolescents with disabilities which limit the time they spend outside
- Anticonvulsant treatment (particularly phenytoin and carbamazepine)

AT –RISK GROUPS REQUIRING SUPPLEMENTATION AND PROPHYLAXIS

The Department of Health (DH) currently recommends vitamin supplementation for the following at-risk groups:

These patients should receive daily supplementation of vitamins A, C and D either as part of a Healthy Start programme, if available locally, or purchased as a multivitamin preparation (see appendix 2).

A dose of 400 IU (10 microgram) daily (as part multivitamin preparations e.g. ABIDEC or Dalivit) is sufficient to prevent vitamin D deficiency and rickets. Dalivit is a preferred preparation if there is history of peanut allergy.

- Breastfed infants from 6 months of age (or from 1 month of age if there is any doubt about the mother's vitamin D status during pregnancy)
- Formula fed infants > 6 months who are taking less than 500 mL of formula/day
- All children between 1 and 5 years of age
- Infants or children previously treated for rickets or vitamin D deficiency
- Children who are fussy eaters and those of Asian, African, Afro-Caribbean and Middle-Eastern origin. Clinical deficiencies have been most reported among children of African-Caribbean and South Asian origin.
- Children who are not exposed to much sun, for example those who cover their skin for cultural reasons or those confined to indoors for long periods.
- Children taking phenytoin and carbamazepine

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Vitamin D deficiency in mothers during pregnancy and breastfeeding is the cause of deficiency in their infants, so prophylaxis should be given to pregnant or breastfeeding women.[6,7,8]

NICE guidelines on antenatal care 2008 (CG062): " All women should be informed at the booking appointment 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 may choose to take 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.

Liquid form

Routine supplementation in the infant:

Abidec® / Dalivit® 0.6 mL contains 400 units ergocalciferol, Vit A, B group and C

Recommend Dalivit if there is suspected or proven peanut allergy

CLINICAL ASPECTS OF TREATMENT

Drug Name: Colecalciferol (vitamin D3)

Colecalciferol (D3) and ergocalciferol (D2) are used for prophylaxis and treatment. The two forms can be considered bioequivalent and interchangeable with a 10 microgram dose of colecalciferol or ergocalciferol giving 400 units of vitamin D. Colecalciferol however tends to be preferred due to its better availability and ergocalciferol should only be prescribed if colecalciferol is unavailable.

Alfacalcidol and calcitriol are not suitable for the management of nutritional rickets and vitamin D deficiency as they can cause hypercalcaemia and do not correct the deficiency. Therefore they must not be used for the treatment of vitamin D deficiency.

Available products:

- Please see appendix 1 for BHRUT
- For primary care, please refer to the list of preferred products (available on any of the BHR CCGs' websites)

Some products may contain peanut (arachis) oil, sunflower oil or soya oil. Allergy to these may lead to severe allergic reactions including anaphylaxis. Healthcare professionals should check for allergies before prescribing or when recommending supplements. Patients/carers should also be advised to raise allergies at the point of dispensing or purchase to ensure the content of the product is safe to take.

Summary of investigation and treatment of vitamin D deficiency in children (<18 years of age)

A. Vitamin D testing would be indicated in the presence of the following (in the context of child's age):

1. Tetany
2. Irritability in infants
3. Leg Bowing/knock knees
4. Impaired linear growth
5. Skeletal deformity
6. Muscle pain/weakness
7. Bone pain

Tests for suspected vitamin D deficiency: 25 OHD, Ca, PO4, PTH (if skeletal deformity and symptoms suggestive of hypocalcaemia e.g; tetany/seizure) U&E, FBC

If 25-OHD <30 nmol/l: consider commencing treatment as per guideline until assessed by secondary care specialist

B. Consider referral to secondary care (paediatric specialist) if 25-OHD is >30 nmol/l but clinical concerns remain.

C. Treatment of vitamin D deficiency:

Doses:

- 1 to 6 months: 3000 IU daily for 8 to 12 weeks
- 6 months to 12 years: 6,000 IU daily for 8 to 12 weeks
- 12-18 years: 10,000 IU daily for 12 to 18 weeks

For asymptomatic vitamin D deficiency: check bone profile and vitamin D level at the end of 3 months

If suboptimal response to treatment: consider non compliance and discuss with secondary care specialist.
Once 25-OHD >50 nmol/l: consider maintenance supplement (if risk factors remain) and lifestyle advice
D. 25-OHD >30 <50 nmol/l:

- Safe exposure to sunshine and diet
- Healthy Start vitamins (all eligible children<5 years)
- Alternatively Abidec/Dalivit drops: < 1year 0.3 ml (contains 200 IU ergocalciferol); > 1 year: 0.6 ml (400 IU ergocalciferol)

Summary of treatment recommendations:

Deficiency: 25-OHD< 30 nmol/l Once levels returned to normal, assess need for long term supplementation	Consider refer to secondary care if there are concerns; commence treatment in primary care. 1-6 months: 3000 IU colecalciferol daily for 8 -12 wks 6 months -12 yrs: 6,000IU daily for 8-12 wks > 12 yrs: 10,000IU daily for 12 -18 wks
Insufficiency: 25-OHD >30< 50 nmol/l	Advise on diet + exposure to safe levels of sunshine. Healthy start vitamins Alternatively Abidec/Dalivit (<1 yr: 0.3 ml daily, >1 yr: 0.6 ml daily)

Criteria for referral to specialist:

1. All infants and children with hypocalcaemia, even if asymptomatic (urgent referral)
2. Any child with deformities or orthopaedic abnormalities related to rickets.
3. If the diagnosis is uncertain or there appears to be no risk factors.
4. Poor response to treatment.
5. If associated with significant abnormality of Alkaline Phosphatase (twice the upper limit of normal) and/ or calcium (lower than normal).

DIAGNOSIS OF VITAMIN D DEFICIENCY AND RICKETS

Clinical features of vitamin D deficiency

Infants:

- Widened epiphyses (wide wrists and ankles)
- Bowed legs or wide based gait
- Floppiness and irritability

Older children and adolescents:

- Bone pain
- Muscle weakness
- Poor growth

Initial investigations if there is clinical suspicion:

- U&E (urea and electrolytes)
- Calcium, Phosphate
- Liver function tests

- Parathyroid hormone (raised in vitamin D deficiency and is useful for differentiating from other rare causes of rickets e.g. phosphate deficiency): if there are skeletal deformities suggestive of rickets.

- 25-hydroxy vitamin D (D2+D3) level: can fluctuate according to intake and hence it is possible to have a normal vitamin D level with clinical rickets.
  25-hydroxy vitamin D (D2+D3) level <30 nmol/l is considered as deficient, >30 and <50 nmol/l is considered as insufficient. [2,9]

- Radiology: X ray is not needed in all cases. The typical X-ray appearances are characteristic and do not occur in other calcium or bone disorders. Radiological rickets is caused by vitamin D deficiency (poor intake or absorption and rarely by inborn errors of vitamin D metabolism). It is possible to be significantly deficient in vitamin D without obvious bony abnormality, and older children and adolescents with vitamin D deficiency do not develop the features of rickets.

DOSE OF VITAMIN D FOR TREATMENT OF DEFICIENCY AND RICKETS

Usual doses:

Expressed as colecalciferol or ergocalciferol daily

Age	Dose	Treatment duration
1 to 6 months	3,000 units once a day	To be reviewed every 3 months to ensure 25-hydroxyvitamin D level > 25nmol/l and resolution of clinical and radiological abnormalities (as appropriate).
6 months to 12 years	6,000 units once a day	
> 12 years	10,000 units once a day	

Who should be treated?

- Children with 25-hydroxy vitamin D levels <30 nmol/l and symptoms suggestive of vitamin D deficiency
- Any child with radiological features of rickets, even if 25-hydroxy vitamin D levels are in the normal range
- Infants and children with complex medical disorders e.g. liver disease, intestinal malabsorption, may require higher, pharmacological doses of vitamin D which would require careful monitoring (see below)

Asymptomatic children with 25-hydroxy vitamin D level of <30 nmol/l:
There is a lack of evidence on the best treatment regime for children with vitamin D deficiency without any symptoms.

Dosing in intestinal malabsorption or in chronic liver disease

By mouth or by intramuscular injection:

- Child 1 to12 years: 10,000 – 25,000 units daily
- Child 12 to18 years: 10,000 – 40,000 units daily

The total monthly dose can be administered as a single dose as it is an oily formulation with a slow release effect (unlicensed dose).

(Alternatively 1,25 dihydroxycolecalciferol/Rocalcitrol may be used)

DURATION OF THERAPY AND MONITORING PARAMETERS

The aim of treatment should be achieving a serum level of over 50nmol/l. [9]

Treatment doses of colecalciferol or ergocalciferol should be given until alkaline phosphatase (ALP) is within normal limits, 25 hydroxyvitamin D levels >50 nmol/l and radiological features (if X-ray was done) of rickets have resolved.

1. Biochemical vitamin D deficiency with hypocalcaemia

Children with symptomatic hypocalcaemia must be referred to secondary care urgently where appropriate treatment and further investigations will be carried out.

Calcium supplements must be started at the same time as vitamin D treatment for any child with serum calcium below the normal range. Calcium supplements should be given at 30-75 mg/kg (0.75 to 2 mmol/kg/day) in 3 divided doses. For most children and adolescents liquids or effervescent tablets are preferable. Calcium supplements should be continued until serum calcium is normal *(>2.2 mmol/l).

See Appendix 4 (page 14) for calcium supplements

Calcium, phosphate and LFTs should be rechecked and checks continued at least fortnightly (by secondary care –see Monitoring below) until calcium levels are normal. Treat with vitamin D for at least 3 months and if ALP is normal and 25 hydroxy vitamin D is >50 nmol/l, change to prophylactic dose with a multivitamin preparation. If not, continue treatment for another 3 months and recheck. This is the most severely affected group and is most likely to require longer treatment.

2. Biochemical vitamin D deficiency with radiological rickets

After 3 months treatment recheck the investigations above. If ALP normal and 25 hydroxy vitamin D level>50 nmol/l, change to a multivitamin preparation for prophylaxis. Children with severe rickets may require a longer period of treatment. Consider repeating the X-ray after 6 months to confirm radiological resolution of the rickets. Complete resolution may take longer than this and monitoring should continue until it does. Consider discussing with secondary care if biochemical and/radiological abnormalities persist after 6 months.

3..Biochemical vitamin D deficiency without bony abnormality or hypocalcaemia:

After 3 months of treatment consider rechecking the investigations above (depending on presenting clinical symptoms). If ALP within normal limits and 25-hydroxy vitamin D level >50 nmol/l, change to a multivitamin preparation for prophylaxis. If not, continue for another 3 months and recheck.

In summary for rickets with or without hypocalcaemia

Pre-treatment	Serum 25-OHD, bone profile and U+Es, PTH, X-ray (if appropriate)	
Monitoring	U+Es Bone profile 25-OHD	All children: At the end of 3 months treatment (bone profile, U&E, 25-OHD). Further monitoring depends on symptom resolution, healing of rickets and vitamin D levels. Aim for Vitamin D > 50 nmol/l. This is expected to be done in primary care. * Infants age <6 months ideally should have their bone profile checked at 4 weeks post treatment to avoid rare incidents of hypercalcaemia. This will be done in secondary care ** All children presenting with vitamin D deficiency with hypocalcaemia would also require close monitoring of calcium levels. These cases will need close monitoring in the secondary care and hence it is expected to have these tests done in secondary care.
	X-ray (if done at baseline)	At 6 months. Further X-rays may be needed depending on degree of healing.

Dose titration

Serum 25-OHD after 3 months (or more) treatment	Action
> 50 nmol/mL	Acceptable range
>30 and < 50 nmol/mL	Supplementation recommended
<30 nmol/ml	Continue/increase current treatment dose and reassess in 3 months or in case of non-adherence, consider stoss therapy

KEY ADVERSE EFFECTS & ACTIONS

If the recommended doses are adhered to side effects are rare. Side effects are generally associated with excessive intake of Vitamin D leading to the development of hypercalcaemia. [11]

Levels of 250 nmol/l have been reported following sunlight exposure and therapy without any adverse effects. Toxicity is likely to require serum levels over 500 nmol/l. There are few published reports of hypercalcaemia following colecalciferol/ergocalciferol treatment. Studies have confirmed the safety of relatively high doses given to children and adults with or without vitamin D deficiency.[11, 12, 13, and 14]

Adverse effects	Symptoms/signs	Actions
hypercalcaemia	Anorexia, nausea and vomiting, headache, dry mouth, fatigue and muscle weakness.	Suspend treatment and urgent referral to secondary care (telephone consultation with on call paediatric consultant)

This only lists the key important ADRs-For comprehensive information on cautions, contra-indications and interactions please refer to the current British National Formulary and Summary of Product Characteristics (SPC). (N.B. Unlicensed products will have no SPC)

Contraindications:

- Hypercalcaemia
- Evidence of vitamin D toxicity
- Metastatic calcification

Clinically significant interactions

Anti-convulsants: vitamin D requirements may be increased in patients taking anti-convulsants (e.g. carbamazepine, phenobarbital, phenytoin and primidone)

For comprehensive information please refer to the current British National Formulary and Summary of Product Characteristics. (N.B. Unlicensed products will have no SPC)

TREATMENT FAILURE

The most likely reason for failure of biochemical resolution or of healing of rickets is poor adherence to treatment.

Stoss therapy (from the German word stossen, meaning "push") may be considered if there are concerns with regards to adherence. It involves oral or intramuscular administration of the total treatment dose of vitamin D given in two divided doses twelve hours apart if given orally or as a single dose if given IM. This may need to be repeated (usually every 3 months) if poor compliance persists with maintenance dosing.

Age	Dose for stoss therapy
1 to 12 months	150,000 units in 2 divided doses PO or single dose IM
1 to 12 years	300,000 units in 2 divided doses PO or single dose IM
12 to 18 years	500,000 units in 2 divided doses PO or single dose IM

Most infants and children will continue to have risk factors for vitamin D deficiency and hence should continue on prophylaxis with a multivitamin preparation after treatment.

SHARED CARE

Shared care guideline*:* is a document which provides information allowing patients to be managed safely by primary care, secondary care and across the interface. It assumes a partnership and an agreement between a hospital specialist, GP and the patient and also sets out responsibilities for each party. The intention for shared care should be explained to the patient and accepted by them. Patients are under regular follow-up and this provides an opportunity to discuss drug therapy. Intrinsic in the shared care agreement is that the prescribing doctor should be appropriately supported by a system of communication and cooperation in the management of patients. The doctor who prescribes the medicine has the clinical responsibility for the drug and the consequence of its use**.**

Consultant

1. Assessment of the patient who has been referred by the GP or Community Paediatric Service.
2. Completion of the required investigations to establish a firm diagnosis. The Consultant will provide the GP with correspondence justifying the need for vitamin D treatment.

   Diagnostic criteria to include:
   - Serum 25 OHD, bone profile and U+Es, PTH (in cases with skeletal deformity)
   - X-ray (when indicated: in cases with skeletal deformity))
   - Clinical findings

3. Ensure that the patient/carer understands the rationale and goals of therapy.
4. Ensure that patient/carer understands the treatment regimen and any monitoring or follow up that is required.
5. Initiate treatment and prescribe until the GP formally agrees to share care (as a minimum, supply the first month of treatment).
6. For unlicensed products, to obtain written informed patient consent as per Trust policy on the use of unlicensed medicines and licensed medicines for unlicensed indications.
7. Send a letter to the GP requesting shared care for this patient.
8. To provide a comprehensive referral letter to the GP / Practice nurse detailing:
   - findings (biochemical, clinical, radiological)
   - list of required investigations and their frequency
   - treatment information, dose, frequency and duration
   - any associated drug therapy
   - frequency of hospital review (if required)
   - the potential need for testing and supplementation/treatment of other family members
9. To follow-up the patient at least 6 monthly where treatment duration exceeds 3 months.
10. Ensure regular correspondence with the GP to update about treatment response and developments and any change in treatment including cessation of treatment.
11. Inform GP of patients who do not attend clinic appointments.
12. For patients requiring injectable vitamin therapy e.g. stoss (single mega dose bolus) regimes, to provide this therapy until such time as it is safe and appropriate to transfer to oral therapy.
13. Health promotion: provide advice and information on prevention of vitamin D deficiency
14. Respond to GP queries or requests for support

General Practitioner

1. Provide advice and information on the prevention of vitamin D deficiency to patients and their families identified as being at-risk where appropriate.
2. Reinforce the patient's understanding of the nature, effect and potential side effects of the drug before prescribing it as part of the shared care programme and contact the specialist for clarification where appropriate.
3. Once a patient has been established on treatment, to prescribe regular treatment until biochemical resolution and/or healing of rickets as per this shared care agreement or ADR, etc. The product to be prescribed should be in line with the available formulations in the community. If available formulations are not in the required strength to continue the daily doses initiated by the hospital, the total weekly dose can be given as either a single dose or in two divided doses. GP's will not be expected to prescribe prophylactic vitamin D. This guideline is for treatment only, but does identify at-risk groups that would benefit from dietary and lifestyle advice and/or over-the-counter prophylaxis.
4. To keep the specialist informed of response to treatment, any adverse effects or significant new medical presentations.
5. Report any pertinent changes to the patient's regular medication.

Criteria for referral to specialist:

6. All infants and children with hypocalcaemia, even if asymptomatic (urgent referral)
7. Any child with deformities or orthopaedic abnormalities related to rickets.
8. If the diagnosis is uncertain or there appears to be no risk factors.
9. Poor response to treatment.

CCG

1. To provide feedback to trusts via Trust Medicines Committee.
2. To support GPs to make the decision whether or not to accept clinical responsibility for prescribing.
3. To support trusts in resolving issues that may arise as a result of shared care.

Patient/ Carer

1. Report any adverse effects to their GP and/or specialist
2. Ensure they have a clear understanding of their treatment.
3. Report any changes in disease symptoms to GP and/or specialist
4. Ensure compliance with prescribed treatment as well as preventative measures and supplementation as recommended.
5. Ensure attendance at appointments and that repeat prescriptions are requested and collected in good time.

RESOURCES AVAILABLE

Barking, Havering and Redbridge University Hospitals NHS Trust	
Consultant via switchboard	Dr K Banerjee Paediatrics Secretary: 01708 435000 Ext 3938 Paediatrics Fax: 01708503538 Email: kausik.banerjee@bhrhospitals.nhs.uk Dr M Keane Paediatrics Secretary: 01708 435000 Ext 3538 Paediatrics Fax: 01708 503538 Email: morgan.keane@bhrhospitals.nhs.uk
Clinical Pharmacist	Dinesh Gupta: 0208 970 8079 01708 435 142 Email: dinesh.gupta@bhrhospitals.nhs.uk
Pharmacy Medicines Information Dept:	01708435418 (24-hour answer phone)
BHR CCGs Medicines Management Team	0208 822 3074/3076

References:

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2. Royal College of Paediatrics and Child Health (RCPCH) Sept 2014.
3. Ahmed SF, Franey C, McDevitt et al (2011). Recent trends and clinical features of childhood vitamin D deficiency presenting to a children's hospital in Glasgow. Archives of Disease in Childhood 96:694-696
4. Ladhani S, Srinivasan L, Buchanan C and Allgrove J (2004): Presentation of vitamin D deficiency. Archives of Disease in Childhood 89:781-784
5. Maiya S, Sullivan I, Allgrove J (2008) Hypocalcaemia and vitamin D deficiency: an important, but preventable, cause of life-threatening infant heart failure. Heart. 94: 581-584
6. Dawodu A, Wagner CL (2007): Mother-child vitamin D deficiency: an international perspective. Archives of Disease in Childhood. 92: 737-740
7. Hypponen E, Boucher B (2010) Avoidance of vitamin D deficiency in pregnancy in the UK. British Journal of Nutrition 104: 309-314
8. Viljakainen HT, Saarnio E, Hytinantti T et al. (2010) Maternal vitamin D status determines bone variables in the newborn. Journal of Clinical Endocrinology & Metabolism 95: 1749-1757
9. Position statement on Vitamin D by British Paediatric and Adolescent Bone Group (Sept 2013)
10. Lips P, DuOng T, Oleksik A et al (2001): A global study of vitamin D status and parathyroid function in postmenopausal women with osteoporosis: Baseline data from the Multiple Outcomes of Raloxifene Evaluation clinical trial. Journal of Clinical Endocrinology and Metabolism 86: 1212-1221
11. Jones G (2008). Pharmacokinetics of vitamin D toxicity. American Journal of Clinical Nutrition 88 (2): 582 S-586 S
12. Cranney et al (2007). Effectiveness and safety of Vitamin D in relation to Bone Health. Evidence Report/TechnologyAssessment No 158(prepared by the University of Ottawa Evidence Based Practice Center under contract no 290-020021) AHRQ publication no 07-E013
13. Heaney RP, Armas LAG, Shary JR et al (2008): 25 hydroxylation of vitamin D3: relation to circulating vitamin D3 under various input conditions. American Journal of Clinical Nutrition 87, 1738-1742
14. Maalouf J, Nabulsi M, Vieth R et al (2008) Short and long term safety of weekly high dose vitamin D3 supplementation in school children.Journal of Clinical Endocrinol & metabolism 93, 2693-2701
15. Misra M, Pacaud D, Petryk A et al: On behalf of the drug and therapeutics committee of the Lawson Wilkins Pediatric Endocrine Society (2008) Vitamin D deficiency in children and its management: review of current knowledge and recommendations; Pediatrics 122, 398-417
16. Barts and the London Clinical Effectiveness Group: Vitamin D guidance (2011): http:// www.icms.qmul.ac.uk/nhs/Docs/42772

Useful information:

1. Department of Health recommendations: www.healthystart.nhs.uk: Vitamin D & other vitamin supplements for infants and children NICE guideline CG62: Supplements for pregnant and breastfeeding mothers
2. British Society for Paediatric Endocrinology and Diabetes: Expert opinion on Vitamin D Treatment 2009
3. Vitamin D: an essential nutrient for all but who is at risk of vitamin D deficiency? Important information for healthcare professionals- DoH Leaflet Jan 20, 2010
4. Update on vitamin D.Position statement by the Scientific Advisory Committee on Nutrition 2007. http://www.scan.gov.uk
5. East & South East England Specialist Pharmacy Services. (2011). Vitamin D deficiency and insufficiency in adults and paediatrics: a guideline collation document for London and East and South East England
6. East and South East England specialist pharmacy services (2011): vitamin D deficiency and insufficiency. Using appropriate available products

Refer to any of the BHR CCGs website to obtain the latest version of this guideline

APPENDIX 1 **Preparations for the treatment of deficiency (25-OHD <30nmol/L) in children (BHRUT only)**

BHRUT use only - For primary care, please refer to the list of preferred products (available on any of the BHR CCGs' websites)

Some products may contain peanut (arachis) oil, sunflower oil or soya oil. Allergy to these may lead to severe allergic reactions including anaphylaxis. Healthcare professionals should check for allergies before prescribing or when recommending supplements. Patients/carers should also be advised to raise allergies at the point of dispensing or purchase to ensure the content of the product is safe to take.

Drug and dose recommendation	Preparations, manufacturers and distributors	Licensing and risk considerations
Age 1 to 6 months: 3,000 units once a day	Vigantoletten (colecalciferol) tablets 1000 units Pack size: 30 tablets Available from IDIS world medicines, tel 01932 824100	Does not have a UK marketing authorisation. Manufactured and licensed by Merck Pharmaceuticals, Germany
Age 6 months to 12 years: 6,000 units once a day		
Age 12 years and over: 10,000 units once a day	Zymad liquid 10,000 units per ml. Pack size: 10ml Available from IDIS world medicines, tel. 01932 824 100;	Does not have UK marketing authorisation. Manufactured and licensed by Novartis, France.

Treatment of deficiency (25-OHD <30nmol/L) in children with intestinal malabsorption or chronic liver disease

Drug and dose recommendation	Preparations, manufacturers and distributors	Licensing and risk considerations
By Mouth		
Age 1 to 12 years: 10,000 to 25,000 units daily Age 12-18 years: 10,000 to 40,000 units per day	For doses of 10,000 units per day see above products For doses greater than 10,000 units per day: Zymad (colecalciferol 10,000 units per ml) drops. Pack size: 10ml Available from IDIS world medicines, tel 01932 824100	Does not have a UK marketing authorisation. Manufactured and licensed by Novartis, France.
By intramuscular injection		
Age 1 to 12 years:	Ergocalciferol injection 300,000 units/mL Pack size: 10 x 1ml injections	Product has a UK Marketing authorisation.

10,000 to 25,000 units daily Age 12-18 years: 10,000 to 40,000 units per day Total monthly dose to be administered as a single dose by intramuscular injection (unlicensed dose).	Ergocalciferol injection 600,000 units/2mL Pack size: 10 x 2ml injections Available from Focus Pharmaceuticals, tel 01283 495280	

Treatment of deficiency (25-OHD <30nmol/L) where failed compliance with oral treatment (Stoss therapy) (BHRuT only)

Drug and dose recommendation	Preparations, manufacturers and distributors	Licensing and risk considerations
Age 1 to 12 months: 150,000 units in 2 divided doses PO or single dose IM Age 1 to 12 years: 300,000 units in 2 divided doses PO or single dose IM Age 12 to 18 years: 500,000 units in 2 divided doses PO or single dose IM (Above doses repeated 3 monthly)	Oral therapy:	
	Drisdol (ergocalciferol) capsules 50,000 units Pack size: 50 capsules Available from Pharmarama, tel 02082386670 and IDIS world medicines, tel 01932 824100 Vigantol (colecalciferol) 20,000 IU/mL oral solution drops Available from IDIS world medicines, tel. 01932 824 100;	Does not have a UK marketing authorisation. Manufactured and licensed by Sanofi Aventis, US. Does not have UK marketing authorisation. Manufactured and licensed in Germany
	By intramuscular injection:	
	Ergocalciferol injection 300,000 units/mL Pack size: 10 x 1ml injections Ergocalciferol injection 600,000 units/2mL Pack size: 10 x 2ml injections Available from Focus Pharmaceuticals, tel 01283 495280	Product has a UK Marketing authorisation, however doses in Stoss therapy are unlicensed.

Appendix 2

Drug and dose recommendation	Preparations, manufacturers and distributors	Licensing and risk considerations
Multivitamin supplementation Neonates: 400 units once a day Child 1 month to 18 years: 400 to 600 units each day	Abidec multivitamin drops containing colecalciferol 400 units per 0.6ml [contains 1333 units of vitamin A per 0.6ml]. Pack size: 50ml (£2-20) Dalivit multivitamin drops containing colecalciferol 400 units per 0.6ml [contains 5,000 units of vitamin A per 0.6ml] – not suitable for prolonged therapy Pack size: 25ml (£2-98); 50ml (£4-85)	These products have a UK marketing authorisation
Vitamin D supplementation Neonates: 400 units once a day Child 1 month to 18 years: 400 to 600 units each day Pregnancy: 400 units once a day	Vitamin D3 400 unit (10 microgram) capsules Pack size: 100 capsules Price £2-99 (contain gelatin) Available for purchase only from Holland and Barrett Vitamin D3 400 unit (10 microgram) tablet Pack size: 180 tablets Price: £4-99 (suitable for vegetarians) Available for purchase from Healthy Direct Ergocalciferol tablets 400 unit – 'Just Vitamins' Pack size: 180 tablets Price £4-75 (suitable for vegans) Vitamin D3 400 unit tablets – 'Nature's Remedy' Pack size: 60 tablets Price: £3-99 Vitamin D3 400 unit tablets – 'Nature's Best' Pack size: 180 tablets Price: £4-85	These products do not have a UK marketing authorisation. Marketed as nutritional supplements.

APPENDIX 3

BHRuT

SHARED CARE GUIDELINES ON

Vitamin D (ergocalciferol; colecalciferol)

For the prophylaxis and treatment of symptomatic vitamin D deficiency in infants, children and adolescents (BHRuT)

SHARED CARE AGREEMENT LETTER

Name of GP …… Address ……
……..……..
..……..……
..……..…

Dear GP

Re: Patient's Name……..……

Date of Birth…….……

Hospital Number……..……

Indication for ……..……

Route……(Oral etc)

Dose…….mg per day.

Enclosed is a copy of the shared care guidelines for [Drug Name] to be retained in the patient's notes.
Should you agree to shared care, we will send a letter containing the details of the patient's treatment plan, the dose to be prescribed and all relevant blood results.

Please sign below and return this letter to the Hospital Specialist if you agree to the shared care arrangements for this patient.

Many thanks

Hospital Specialist GP

Signature…….. Signature……...

Name ……..…….. Name ……...

Date…….. Date……..…..……...

If you are not taking on shared care for this patient please state the reason why and return this letter to the Hospital Specialist.
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……
……

APPENDIX 4

Oral calcium preparations for treatment of hypocalcaemia (Serum Calcium <2 mmol/l) [for BHRuT only]

Severe (serum calcium< 1.8 mmol/l) symptomatic hypocalcaemia requires intravenous infusion of 10% calcium gluconate. Often this needs to be followed by continuous intravenous infusion over 24 hour or longer.
Persistent hypocalcaemia requires oral calcium supplementation along with appropriate dose of vitamin D.

Dosage:
Up to 4 years: 0.25 mmol/kg Four times a day
5 to 12 years: 0.2 mmol/kg Four times a day
Above 12 years:10 mmol Four times a day

The following products are available:

1) Alliance Calcium Syrup (Alliance Pharmaceuticals, UK): Each 5 ml contains 2.5 mmol of calcium. It contains fructose and is free from gluten, peanuts, nuts, eggs, fish, soy and milk
2) Sandocal 1000 effervescent tablets: 1 tablet contains 25 mmol of calcium. It contains aspartame and hence can not be used in children with Phenylketonuria.
   Dissolve 1 tablet in 45 ml water to get 50 ml solution containing 25 mmol calcium (0.5 mmol calcium/ml).
3) Cacit 500 effervescent tablet: I tablet contains 12.5 mmol calcium. It is aspartame free.
   Dissolve 1 tablet in 24 ml water to get 25 ml solution containing 12.5 mmol calcium.

Large volume of effervescent tablets could be unpalatable. In practice, the solution should be prepared as above and the required volume containing the recommended dose should be added to squash and to be administered immediately.
All the products contain sorbitol or fructose and hence may not be suitable for children on ketogenic diet.