Vitamin D Deficiency in Forensic Psychiatry

Vitamin D deficiency is a topic which has been publicised in the media recently following recommendations from Public Health England in July 2016. They outlined that people should consider taking a daily supplement containing 10 micrograms of vitamin D in autumn and winter, and that some specific groups should take this year round.

The latest Clinical Knowledge summary from NICE - Vitamin D deficiency in adults - treatment and prevention, published in November 2016, builds upon earlier NICE guidance. This recent summary included the recommendation that:

‘all adults living in the UK should be advised to take a daily supplement containing 400 international units (10 micrograms) of vitamin D throughout the year, including in the winter months.’

The Scottish Government have also made recommendations following the Scientific Advisory Committee on Nutrition advice which are generally similar, although they did highlight that some people might choose not to take a vitamin D supplement between April and September, as the majority of people aged 5 years and above will probably obtain sufficient vitamin D from sunlight when they are outdoors.

Background

Over 90% of vitamin D is produced by the skin after exposure to Ultraviolet B light from the sun or other artificial sources. It also occurs naturally in a limited range of foods such as seafood, mushrooms and egg yolks. Vitamin D plays an essential role in bone and mineral metabolism, muscle function and immunity. Vitamin D deficiency is associated with rickets in children and osteomalacia in adults, manifest as malaise, skeletal deformity, bone pain and low trauma fractures. Osteomalacia is associated with abnormal biochemistry – high serum alkaline phosphatase, serum calcium low/low normal, serum PTH high & low vitamin D, usually <30nmol/L. The primary aim in giving Vitamin D to patients is to prevent this Vitamin D deficiency syndrome. A range of health problems ranging from MS to heart disease, from TB to cancers at various sites have been associated with low levels of vitamin D (and higher latitude) BUT there is no or insufficient evidence to support a causal link between vitamin D and any of these conditions. There is also no evidence that giving vitamin D alters the incidence of any of these conditions.

Vitamin D levels of < 25-30nmol/L are generally considered as ‘deficient’ (however even at this level most people do not have osteomalacia).

Severe and enduring mental illness is associated with poor nutrition and unhealthy lifestyles. Antipsychotic medication, anti-epileptic drugs, inadequate vitamin D intake, application of sunscreen and limited or no solar exposure over a prolonged period make patients in secure hospital environments more vulnerable to deficiency states with adverse effects on bones.

State Hospital (Carstairs) Study

A study at The State Hospital (TSH), a high security psychiatric hospital for men in Carstairs, South Lanarkshire - Feasibility of screening for and treating vitamin D deficiency in forensic inpatients was published in May 2012. The cross-sectional study involved a population of 157 male patients. In this wider population 69% had a diagnosis of schizophrenia, 55% a history of chronic physical disorder, 17% suffered
from epilepsy and 89% were on antipsychotic medication. The aim was to examine 30 patients (around 20% of TSH population).

The study involved venous blood samples being obtained for biochemical assay (including calcium, phosphate, alkaline phosphatase and parathyroid hormone) and measurement of Vitamin D, 25-hydroxycholecalciferol (25 OHD). These were obtained at annual medical review with consent. Individuals with serum levels of 25-OHD <25nmol/L were termed deficient, 25-50nmol/l insufficient and > 50nmol/L sufficient.

**Results**

33 patients in total had results that could be analysed. 58% were deficient (19 patients), 36% were insufficient (11 patients) and only 6% (2 patients) had normal levels of 25-OHD. It was noted that from the group analysed all 7 patients who had no grounds access were deficient, although the achieved sample size was small and lacks sufficient power to show strong associations. 3 of the deficient group had biochemical evidence of secondary hyperparathyroidism (PTH > 6pmol/L).

One year later, of the initial sample 15/31 eligible patients had accepted and continued supplements, 10/31 had refused or discontinued treatment and 6/31 had been discharged before treatment options could be discussed.

Although the study methodology was not focused entirely on obtaining a representative sample, the authors argued that the results were alarming and that there was overwhelming evidence of vitamin D deficiency in individuals with mental disorder involuntarily detained at TSH.

**NHS GG&C Guidance**

NHS GG&C has produced Clinical Guideline available from the local staffnet - [Vitamin D: Prevention & Treatment of Deficiency in Adults](#). This was published in November 2016, around the time of the recent NICE Clinical Knowledge summary. This guidance was produced by the NHSGG&C Osteoporosis Strategy Group and gives advice on how to treat adults who are at risk of or who are known to have deficient/insufficient levels of Vitamin D. The guidance was written for primary and secondary care prescribers and refers to adults only.

It outlines that the Vitamin D that is routinely measured in the laboratory is 25-hydroxyvitamin D$_3$ (25(OH)D$_3$). This compound is inactive, but is stable, and serum levels correlate reasonably well with Vitamin D activity. This is the vitamin that is measured when “vitamin D” measurement is requested through biochemistry.

The guidance has advice on when to measure Vitamin D and when not to measure Vitamin D. It also highlights that follow-up measurements are generally not required and in the occasional exceptions repeat testing is only appropriate after 6 months supplementation.

The guidance contains 2 flowcharts on when supplementation of Vitamin D is indicated and what to prescribe, and these can be followed by clinicians;

- Flowchart 1 – Vitamin D: Prevention & Treatment of Deficiency in Adults.
- Flowchart 2 – Vitamin D: Deficiency in Adults in the context of (or at increased risk of) osteomalacia, osteoporosis or increased risk of fracture.
Flowchart 1 – Vitamin D: Prevention & Treatment of Deficiency in Adults

Which patient population are you managing?

Patients with:
- Proven or possible osteomalacia
- Osteoporosis
- Increased risk of fracture

Pregnant or breastfeeding women particularly teenagers and young women. Vitamin D blood measurement not required.

People aged 65 years and over and people who are not exposed to much sun. Vitamin D blood measurement not required.

Other high-risk asymptomatic patient groups. Vitamin D blood measurement not required:
- Patients with dark skin
- Institutionalised/housebound patients
- Chronic alcohol misusers
- Vegetarians/vegans
- Obese patients
- People who cover up (e.g. Muslim men and women)
- Medical risk factors: renal, hepatic disease unless attending specialist clinics,
  - Specific medicines (e.g. anticonvulsants and anti-retrovirals)

Refer to Flowchart 2 below.

Department of Health recommends a daily supplement containing 10 micrograms (400 units) of vitamin D.

Healthy start vitamins are available from community pharmacy for eligible pregnant women and women with a child under one year old and contain the correct amount of vitamin D for this purpose. See http://www.healthystart.nhs.uk/healthy-start-vouchers/healthy-start-vitamin/ for further details.

Department of Health recommends a daily supplement containing 10 micrograms (400 units) of vitamin D.

Please refer to NHS GGCG Formulary for details of preferred preparations.

Give advice on regular sun exposure (Panel 2), dietary sources of vitamin D (Panel 1) and buying over the counter vitamin D supplements particularly in the winter.

Panel 1: Dietary Sources of Vitamin D
- Oily fish
- Cod liver oil or other fish oils
- Eggs
- Fortified breakfast cereals (see individual product packaging)
- Margarine
- Infant milk formula

Panel 2: Sun exposure advice
When possible, only a limited amount of time should be spent in strong sunlight.
People who choose to expose their skin to strong sunlight to increase their vitamin D status should be aware that prolonged exposure (for example, leading to burning or tanning) is unlikely to provide additional benefit. Exposing commonly uncovered areas of skin such as forearms and hands, for short periods when in strong sunlight provides vitamin D. (Longer periods of exposure may be needed for those with darker skin.)

3. NICE 34 Sunlight exposure: risks and benefits available at https://www.nice.org.uk
NHSGGC Vitamin D Prevention and Treatment of Deficiency in Adults Guideline (November 2016)

Flowchart 2 - Vitamin D: Deficiency in Adults in the context of (or at increased risk of) osteomalacia, osteoporosis or increased risk of fracture

**Are vitamin D levels known?**

**YES**

- **Osteomalacia present?** (comprising non-arthritis bone pain; low vitamin D and raised PTH; raised ALP and calcium low/normal)
  - **NO**
  - **Vitamin D <30 nmol/L**
    - Prescribe colecalciferial 800 unit tab/cap 2 once daily (i.e. 1600 units daily) for three months then 800 units daily for a further 3 months See points 1-3 in Box B: special considerations
  - **Vitamin D 30-50 nmol/L**
    - 30-50 nmol/L may be inadequate in some people – See NOS guidance for further information. See point 1 in Box B: special considerations
  - **NO**
    - Assess whether to measure vitamin D
      - **Vit D Measuring required**
      - **No Vit D measuring required**

**NO**

- **Is patient on treatment with bisphosphonate/denosumab or on bisphosphonate drug holiday?**
  - **YES**
    - Does the patient have documented hypercalcemia
      - **NO**
        - Refer to Flowchart 1 Vitamin D: Prevention & Treatment of Deficiency in Adults (above)
      - **YES**
        - Prescribe colecalciferial 800 units once daily

**Box A: Measuring vitamin D levels**

1. Patients with low adjusted serum calcium (<2.1 mmol/L) and/or possible osteomalacia
2. Patients with malabsorption syndromes
3. CKD (eGFR <30), measurements will be carried out by specialist clinics only

**Box B: Special considerations**

1. If fracture / osteoporosis and for IV zoledronic acid or SC denosumab, give 100,000 units colecaltiferial orally only once and then treat with appropriate ongoing calcium and vitamin D preparation or if calcium contraindicated with separate colecaltiferial supplement.
2. Patients with malabsorption such as coeliac disease / pancreatic insufficiency (e.g. cystic fibrosis) or with chronic liver disease, & low Vitamin D should be treated as for patient with a vitamin D level of <30 nmol/L unless osteomalacia in which case follow guidance above.
3. Patients with chronic kidney disease (& eGFR <30) merit discussion with specialists.

Notes - The use of vitamin D in patients with Primary Hyperparathyroidism should be determined through specialist referral to Endocrinology. Potent vitamin D analogues such as calcitriol or alfacalcidol are typically reserved for patients with renal osteodystrophy or for patients with Primary Hyperparathyroidism and should be used in the context of guidance from appropriate specialists - as they carry risk of hypercalcemia / hypercalcaemia.
Summary

Vitamin D deficiency and supplementation is an area that clinicians should consider, especially in high-risk individuals, such as forensic psychiatric inpatients in certain circumstances, or anyone who may be confined indoors for prolonged periods. The local guidance would indicate that Vitamin D blood measurement is not required in asymptomatic patients within this group, and the management options outlined above may not always be possible, necessitating supplementation as per up-to-date formulary advice\(^7\) (currently involving Cholecalciferol as Invita D3 800 units capsules).

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References


4 Scottish Government, Health and Social Care, Vitamin D. Available from: http://www.gov.scot/Topics/Health/Healthy-Living/Food-Health/vitaminD. Accessed on 08/05/2017

