**Over-testing and inadequate management of 25-hydroxyvitamin D status in paediatric secondary and tertiary care**

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Vitamin D is essential for bone health and has uncertain roles in other health outcomes. In the United Kingdom (UK), universal supplementation with 400IU/day vitamin D is recommended during autumn and winter, and throughout the year for groups at risk of vitamin D deficiency (VDD) (1). Vitamin D status can be assessed by serum 25-hydroxyvitamin D [25(OH)D] concentration, but national guidance from the Royal Osteoporosis Society (ROS) recommends against routine testing in children without clinical indication (2). However, 25(OH)D testing has dramatically increased in the UK (3), and at our centre from 1136 tests/year in children (2013) to 3898 (2020).

We assessed adherence to the ROS guidance on indications for 25(OH)D testing (shown in Table 1) and the management of the result in children within secondary and tertiary care at our children’s hospital. Data were collected retrospectively from full clinical records review during November-December 2021 for all children who had 25(OH)D assessed during consecutive 14-day periods in January (n=139) and July (n=173) 2021.

312 test requests (68% outpatient, 30% inpatient, 2% emergency department; 56.1% male; median [(IQR) age 10.6 (5.1-14.3) years) were reviewed. Only 39% of tests were undertaken for indications recommended by the ROS (Table 1). The most common other reasons for testing were short stature, atopy and structural renal tract abnormalities without renal impairment (Table 1).

The ROS defines VDD as <25nmol/l, inadequate as 25–50nmol/l and sufficient as >50nmol/l (2). This group of children is not representative of the general population, but 4.6%, 27.5% and 67.9% had deficient, inadequate and sufficient 25(OH)D, respectively. More children in whom testing was indicated had sufficient 25(OH)D levels (Supplementary table 1), which might reflect greater attention to supplementation in those at higher risk of deficiency.

Of the 12 children with biochemical VDD and accessible clinical records, 42% were advised on high dose vitamin D supplementation, as recommended by the ROS. An assessment of calcium intake is also recommended following confirmed VDD, which was documented in only 30%. Advice on oral vitamin D supplementation was documented for 30% of patients with an inadequate 25(OH)D level, and 9% of patients with sufficient 25(OH)D received feedback on maintenance of 25(OH)D through diet and supplementation.

Despite the limitation that our data is based on clinical documentation, which may not fully describe clinical decision making or advice given, our review of practice suggests that serum 25(OH)D testing was often undertaken without strong clinical indication as recommended by the ROS guideline. There are some inconsistencies between guidelines, which might account for a small percentage of testing in our cohort being considered appropriate by an alternate guideline e.g. suspected abusive injuries is not an indication in the ROS guidance but is recommended by the Royal College of Paediatrics and Child Health (4). Nonetheless, few patients were advised on appropriate supplementation, treatment and lifestyle advice based on the biochemical findings. Improved awareness amongst paediatricians, obtained through educational programmes addressing when to test 25(OH)D, management of the result and the routine use of supplementation without biochemical testing, is needed.

**ETHICAL APPROVAL**

The study was approved by University of Southampton Faculty of Medicine Research Ethics Committee (ERGO #67130).

**DISCLOSURES**

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**Tables**

Table 1: Clinical indications for serum 25(OH)D testing in children, as advised by the Royal Osteoporosis Society guideline (2), and the reasons for testing in a sample of 312 children in secondary/tertiary paediatric care.

|  |  |
| --- | --- |
|  | **Testing undertaken for this indication in children’s hospital sample, n (%)** |
| **Clinical indications for 25(OH)D assessment as recommended by the Royal Osteoporosis Society** | **121 (38.8)** |
|  | Symptoms and signs of rickets (e.g. leg bowing, knock knees, rachitic rosary, wrist swelling, craniotabes, delayed tooth eruption) | 3 (1.0) |
|  | Other symptoms associated with vitamin D deficiency (e.g. more than 3 months of unexplained bone pain, muscular weakness, tetany or seizures due to low plasma calcium, infantile cardiomyopathy) | 19 (6.1) |
|  | Abnormal investigations suggestive of vitamin D deficiency (e.g. low plasma calcium or phosphate, raised alkaline phosphatase, radiographic evidence of rickets) | 4 (1.3) |
|  | Chronic disease that may increase the risk of vitamin D deficiency (chronic renal disease, chronic kidney disease, coeliac disease, Crohn’s disease, cystic fibrosis) | 82 (26.2) |
|  | Bone-targeted drugs (e.g. bisphosphonates) | 12 (3.8) |
|  | Reassessment of vitamin D status following treatment of vitamin D deficiency | 1 (0.3) |
| **Other indication without recommendation by the Royal Osteoporosis Society** | **191 (61.2)** |
|  | Short stature/poor growth | 14 (4.5) |
|  | Atopy | 12 (3.8) |
|  | Patient on total parenteral nutrition | 12 (3.8) |
|  | Renal conditions without chronic kidney disease  | 10 (3.2) |
|  | Abdominal pain and/or constipation | 10 (3.2) |
|  | Iron deficiency and/or anaemia | 6 (1.9) |
|  | Acute infection | 6 (1.9) |
|  | Obesity | 4 (1.3) |
|  | Safeguarding  | 3 (1.0) |
|  | Fatigue | 3 (1.0) |
|  | Other | 111 (35.6) |

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