

## A Model for Implementing a Vitamin D<sub>3</sub> Regimen in a Skilled Nursing Facility

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### Abstract

**Purpose:** To describe a process for implementing widespread Vitamin D<sub>3</sub> supplementation in a skilled nursing home setting that didn't require laboratory assessment and was acceptable in a state regulatory environment.

**Methods:** After a discussion with state officials, a chart review of all long-term care residents in a nursing home (The Chateau at Moorings Park) was conducted to identify risk factors noted in a review of medical literature for vitamin D deficiency. Data were also collected on whether or not the patient had been given a Vitamin D deficiency diagnosis, treated with Vitamin D and what dosage, and if there were 25-OH Vitamin D serum level evaluations.

**Results:** Seventy resident charts were reviewed. Thirty-two men and 38 women comprised the cohort evaluated. Hours of sunlight per day (60%), menopause (54%), and muscle weakness (69%) were found to be the most common risk factors present in this population and every patient met at least one risk factor. Also, four patients had a Vitamin D deficiency diagnosis and twenty patients were taking Vitamin D.

**Conclusion:** A screening process without facility-wide laboratory testing for Vitamin D status was acceptable to state regulators. All nursing home patients in this cohort were at risk for Vitamin D deficiency even though they may have had access to the sunshine outdoors. A process for facility-wide Vitamin D supplementation was successfully developed that was acceptable to state officials without requiring laboratory assessment of vitamin D status from every resident. Even so, the process was inconvenient and time-consuming. If these findings are replicated in other facilities, it may be reasonable to recognize a sufficiently high risk of vitamin D deficiency in nursing homes and accept facility-wide vitamin D supplementation. Our report supports such a practice while not compromising the principles of individualized medical care in the nursing home environment.

**Keywords:** Nursing home; Vitamin D deficiency; Long-term care; Skilled nursing facility

### Introduction

Vitamin D deficiency has long been recognized as an undertreated, but important factor in the health and well-being of older adults, especially in a skilled nursing facility [1-9]. It can cause osteomalacia, exacerbate osteoporosis, secondary hypo-parathyroidism, and has been linked to falls and fractures in the nursing home [4,10-12]. Vitamin D aids calcium absorption in the gut and maintains calcium concentrations in the serum [13]. Certain risk factors for vitamin D deficiency have been identified such as low sunshine exposure, advanced age, obesity, skin pigmentation, and malabsorption [14,15]. For decades we have recognized a very high rate of vitamin D deficiency among nursing home residents in the U.S [4,12]. In recent years, the nursing home environment has become more regulated and there has been increasing pressure to individualize care plans for residents. Hence, facility-wide interventions are likely to be discouraged unless ubiquitous medical necessity can be demonstrated. Usually, such practices develop out of government mandate. Some examples include vaccination against influenza or pneumococcal

pneumonia. Regulations from government are subject to different scrutiny than medical directors or other physicians who provide care for individual in facilities on a regular basis [16].

While multiple studies have shown almost ubiquitous prevalence of vitamin D deficiency in nursing facilities, state regulators have indicated the necessity of showing individual evidence of risk in each nursing facility prior to implementing vitamin D replacement to all residents. In order to comply with this concern, we designed a chart-review strategy to identify residents with risk factors for vitamin D deficiency in a skilled nursing home setting and satisfy state regulators of the necessity of implementing vitamin D replacement facility-wide. Concomitantly, a process was developed for implementation of vitamin D supplementation.

### Materials and Methods

During July and August of 2012, 70 subjects at The Chateau, a nursing facility at Moorings Park in Naples, Florida, were assessed for risk for vitamin D deficiency. Residents reviewed included males (32) and females (38) and were all Caucasian. As can be surmised by the living situation of these patients, multiple co-morbidities existed for most patients. The assessment was made through chart review. The

criteria used to determine risk for vitamin D deficiency incorporated factors identified in the medical literature (over 100 articles were reviewed) and were as follows: hours of sunlight/day, skin pigment, malabsorption syndromes (from diagnostic coding and problem lists), obesity (BMI>30 kg/m<sup>2</sup>), kidney disease (from diagnostic coding and problem lists and eGFR<60 ml/min), vitamin-D-rich food intake, muscle weakness, muscle pain, osteoporosis diagnosis, history of bone fractures, bone pain, and menopause. Charts were also reviewed for a vitamin D deficiency diagnosis, presence of vitamin D<sub>2</sub> or D<sub>3</sub> supplementation (as well as dosage) and lab reports of serum measures of 25-OH vitamin D. Hours of sunlight/day were gathered by survey of the individual nurses that cared for each patient. The dietary intake of vitamin D rich foods was assembled through online food logs from the house dietician.

Data collection was completed in August, which was followed by a physician review. A recommendation for vitamin D supplementation was then made to the attending physician. Physician concerns were addressed by the Medical Director. With attending physician approval, the family of the patient was then informed about the vitamin D<sub>3</sub> recommendation (completed September). Vitamin D log documents were assessed and dated. Orders then were provided by the Medical Director through the director of nursing.

## Results

The numbers of patients with each risk factor were added up and the percentages of the total patients with the risk factor were calculated. There were 42 patients (60%) who were reported to have zero hours sunlight/day, 12 (17%) with one hour sunlight/day, 1 (1%) with one hour and a half sunlight/day, 13 (19%) with two hours sunlight/day, 1(1%) with three hours sunlight/day, and 1(1%) with four hours sunlight/day. The average hours of sunlight per day was 0.66 (range: 0-4 hours). No patients took in 2,000 or more units of vitamin D in their diet and all 70 patients had light skin pigment (Caucasian). The most prevalent risk factors were muscle weakness (69%), hours of sunlight/day (0 hours: 60%), and menopause (54%). It is important to note that every patient had at least one of the risk factors.

As for whether or not the skilled nursing home patients had a vitamin D deficiency diagnosis recorded in their list of diagnoses, 4 patients did have the diagnosis. Twenty patients were taking vitamin D of some dosage. The type of vitamin D was predominantly D<sub>3</sub> but 4 patients were taking vitamin D<sub>2</sub>. One patient was taking 50,000 units of vitamin D<sub>3</sub>, two tablets, once a month. Most dosages were below 2,000 units per day [17]. However, there were prescriptions, in six instances, for above 100,000 units per month (such as 50,000 units once per week). Ten out of 70 patients had recorded 25-OH vitamin D serum levels in their charts. None of the 10 residents receiving < 2,000 I.U. of vitamin D per day or equivalent in vitamin D<sub>3</sub> monthly dosing had serum levels of 25-OH Vitamin D>30 ng/mL.

## Discussion

Our data show that skilled nursing patients at The Chateau at Moorings Park have multiple risk factors for vitamin D deficiency, even though they potentially have an ample supply of South Florida sunshine to give them the vitamin D they need. Their inability to get outdoors is mostly due to the serious health conditions that these patients face. Our study population spent on average 0.66 hours outdoors daily. This may seem fairly satisfactory at first, but we must

also consider that the patients mostly cover up well and sometimes wear sunscreen. Residents are, generally, not brought out into open sunlight, and when they are the periods of time are brief. These data were limited because the amount of sunlight exposure was based on the recall of the nursing staff who worked most frequently with the residents. Based on random observation (not described in this report), however, it appears that any error in the amount of sunlight exposure reported, may have exaggerated the average daily amount of sunlight exposure. We can also not directly pinpoint Vitamin D deficiency as the cause of the muscle weakness, muscle pain, bone fractures, and bone pain because there are many different causes for these conditions.

Vitamin D supplementation would certainly be reasonable for this patient population for multiple reasons. Vitamin D deficiency has been associated with decreased bone density resulting in hip and non-vertebral fractures, but it has been reported that with vitamin D<sub>3</sub>-calcium supplementation, non-vertebral and hip fractures can be reduced by 32% and 43%, respectively, in senior women [10,18]. It is of interest to note that daily sun exposure may not be a practical alternative, since one patient with an estimated one hour of direct sun exposure per day had a serum 25-OH vitamin D level well below 30 ng/ml.

Of greatest concern with this assessment is the fact that the process was exceedingly time-consuming (2 months) to gather evidence, assess the evidence, contact attending physicians, family, and finally implement the vitamin D<sub>3</sub> for 70 skilled nursing home patients. It is hoped that some regulatory flexibility will be afforded when population data indicate high risk for vulnerable seniors in the nursing home setting. One plausible scenario may be to require the state regulators to recognize the need for supplementation of vitamin D as the default with individual assessment. In that scenario, documentation would be necessary to withhold vitamin D intervention, so likely to help improve resident health and well-being with no evidence of harm in the dosing recommended by the American Geriatrics Society's recent guidelines [10].

Given the relative safety of vitamin D supplementation in this population, combined with the abundance of evidence of benefit to vitamin D deficient older adults and nursing home residents, in particular, facility-wide supplementation should be encouraged. While the concern of regulatory bodies has traditionally focused on avoiding harm and protecting residents, the concept of encouraging beneficial steps beyond vaccination, should be encouraged.

## Assurances

This descriptor of our quality improvement process required no individual consents and was deemed exempt from IRB approval process.

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