An Alternative Rapid and Effective Regimen for Treating Vitamin D Deficiency in Older People

Dr Tayyab Mahmood and Dr Daniel Enwereji

King's College Hospital NHS Foundation Trust

Introduction

- Vitamin D deficiency has been highlighted as a population-wide problem. Studies have suggested that up to 50% of the general population of the UK is vitamin D deficient whilst 16% are severely deficient. Furthermore, it has been suggested that up to 98% of nursing home residents are vitamin D deficient.
- Most protocols recommend a weekly loading regimen for six to eight weeks and limit the cumulative dose to 300,000 IUs. This time frame, considering frailty in the older population may be a significant time commitment, and the total dose insufficient. Our practice, in contrast, has been a short intensive course of vitamin D replacement over two or three weeks, (depending on serum 25(OH)D level), given daily as 50,000 IU ergocalciferol.

Objectives

After the release of NICE guidelines in 2016, we opted to assess our current practices through a prospective quality improvement study before committing to adopting changes aligned with the new guidance. This evaluation aimed to ascertain the effectiveness of our current approach

Methodology

PDSA 1

- Patients admitted to our acute geriatric ward and identified as vitamin D deficient (25(OH)D < 80 nmol/L) received a two-week course of daily high-dose ergocalciferol (50,000 IU) to replenish their vitamin D stores followed by maintenance therapy with daily Adcal D3 (of 800 IU of vitamin D).
- Serum 25(OH)D level and baseline biochemistry, including renal function, calcium and phosphate levels, were checked and the tests were repeated within four weeks after completion of ergocalciferol to evaluate the effect of treatment.

Results

- The results from 42 patients, 72% female with a mean age of 82 years, showed significant improvements.
- The median pre-treatment level of serum vitamin D was 30.7 nmol/L (range 8 – 67) which increased to 91.7 nmol/L (range 40 – 175) following 2 weeks of treatment, resulting in a 265% increase in median vitamin D levels.
- Of the 12 patients with severe vitamin D deficiency (level <20nmol/L) the two-week course was insufficient to adequately replenish the depleted stores in the majority of cases (**Figure 1**): Five (42%), achieved normal serum 25(OH) D levels.
- In contrast, 70% of those with serum levels of >20 nmol/L reached normal levels following the 2-week course of treatment.

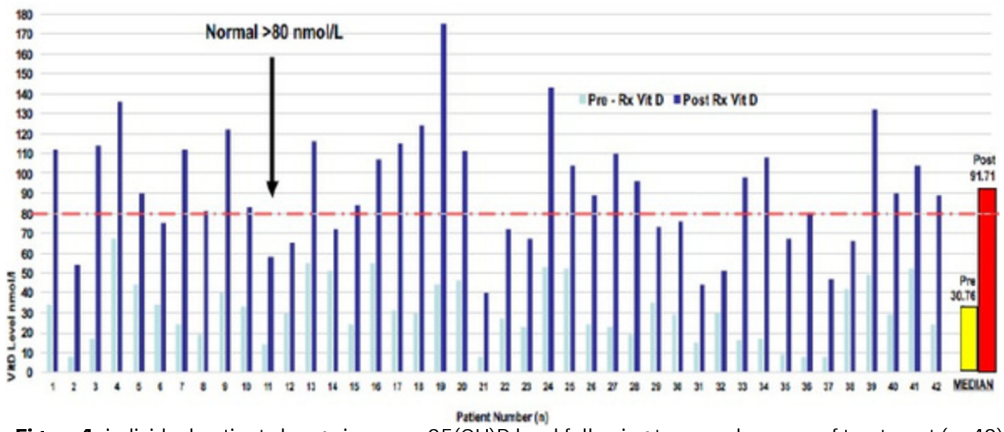

Figure 1: individual patient change in serum 25(OH)D level following two-week course of treatment (n=42)

PDSA 2

Following PDSA 1, we extended our treatment protocol to three weeks for patients with severe vitamin D deficiency (≤20nmol/L) and monitored our results. 34 patients over the age of 65 years were included. The mean age was 82.9 years with 62% females.

Results

A significant improvement in response was noted, with 100% of the patients reaching vitamin D levels above deficiency (>40nmol/L), and 71% achieving normal serum 25(OH)D levels after the three-week treatment (**Figure 2**). Importantly, in both studies, no side effects were reported, and no patient reached toxic vitamin D levels.

Conclusion

- Our results show that higher doses than the recommended (generally 300,000 IU) in current guidelines are needed to treat vitamin D deficiency, especially in severe cases where vitamin D is below 20 nmol/L.
- Our initial group of patients received a total cumulative dose of 700,000 IU (50,000IU X14 days) of ergocalciferol, whereas the second group with severe deficiency (<20nmol/L), were given 1 million IU of vitamin D2 orally over 21 days with good results.
- Even at this high dose, 30% of patients with severe deficiency did not reach normal serum levels. This confirms that the current recommendations are below the dosage required to achieve normalcy.

Limitations

•These results specifically pertain to vitamin D2 (ergocalciferol) and do not consider other forms.
•Vitamin D3 (cholecalciferol) has higher bioavailability and is potentially more effective.
•This was based on a locally performed pilot study with small patient numbers and may not accurately reflect what would be seen in larger populations.

What's Next?

Given the high prevalence of vitamin D deficiency, a large high-quality study is urgently recommended to determine the most appropriate regimen to effectively tackle this epidemic.

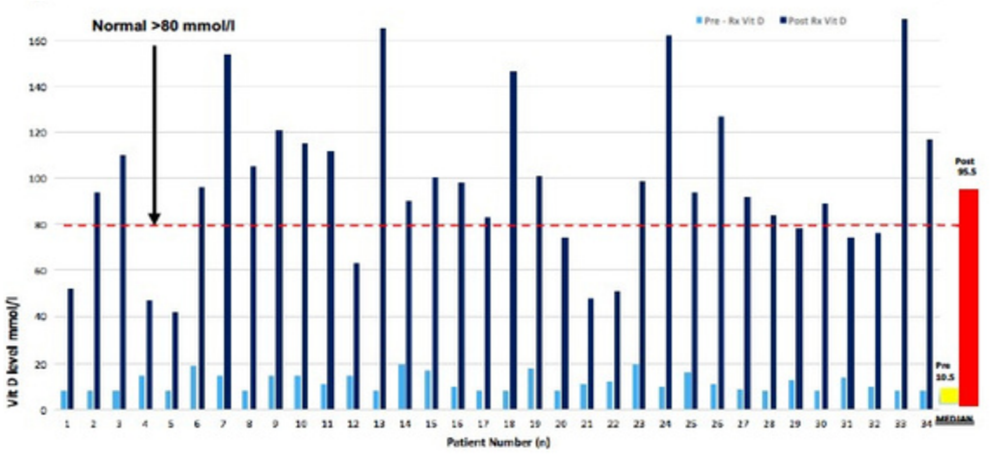

Figure 2: 25(OH)D levels pre and post treatment in patients with severe vitamin D deficiency on 3 weeks ergocalciferol (n=34)