

## Hypovitaminosis D: Which Guidelines for Baseline Supplementation Should Be Followed?

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**Background/Purpose:** Hypovitaminosis D is prevalent among orthopaedic trauma patients and is a risk factor for fragility fractures as well as bone healing complications. There are two major sets of guidelines that address what level of baseline vitamin D supplementation is appropriate, but they differ significantly in their recommendations. The Institute of Medicine recommends 400 IU daily while the Endocrine Society recommends a higher dose (2000 IU daily). The objectives of this study were to prospectively evaluate risk factors for hypovitaminosis D in an orthopaedic trauma population and to determine the level of baseline supplementation associated with normal vitamin D levels at presentation.

**Methods:** A prospective observational study was performed in patients undergoing operative treatment for orthopaedic trauma at a Level I trauma center (January to December, 2014). Levels of 25-hydroxy vitamin D (25-OH D) were obtained for 259 patients. Patient and injury characteristics were recorded including age, sex, race, insurance, smoking, body mass index (BMI), comorbidities, preinjury supplementation, and low versus high-energy mechanism. Prevalence of insufficiency (25-OH D <30 ng/mL) and deficiency (25-OH D <20 ng/mL) were determined. Univariate analyses of patient and injury characteristics determined associations with hypovitaminosis D and multivariate logistic regression analysis assessed for independent associations.

**Results:** Among 259 patients, 191 (73.7%) were vitamin D insufficient and 109 (42.1%) were deficient. 52 patients (20.1%) were receiving preinjury supplementation (200 to 5000 IU daily). Supplementation was more common over age 70 (36 of 99, 36.6%) than below age 70 (17 of 159, 10.7%),  $P < 0.0001$ . Univariate predictors of hypovitaminosis D included lack of preinjury supplementation, non-white race, younger age, female sex, non-Medicare insurance, smoking, obesity, Charlson Comorbidity Index <2, and high-energy mechanism. On multivariate analysis only preinjury supplementation (odds ratio [OR] 0.33, 95% CI 0.16-0.71,  $P = 0.004$ ) and non-white race (OR 4.58, 95% CI 1.94-10.79,  $P = 0.001$ ) were independently associated with hypovitaminosis D. The 25-OH D level demonstrated a dose-dependent association with baseline vitamin D supplementation. Among those on supplementation, the prevalence of insufficiency was 9 of 11 (81.8%) for <500 IU daily, 17 of 31 (54.8%) for 500 to 1000 IU daily, 8 of 18 (44.4%) for 1000 to 2000 IU daily, and 4 of 16 (25%) for >2000 IU daily. Deficiency (25-OH D <20 ng/mL) was 4 of 11 (36.4%) for <500 IU daily, 6 of 31 (19.4%) for 500 to 1000 IU daily, 2 of 18 (11.1%) for 1000 to 2000 IU daily, and 1 of 16 (6.3%) for >2000 IU daily.

**Conclusion:** Lack of preinjury supplementation and non-white race were independently associated with hypovitaminosis D, which was highly prevalent in the population. Although baseline vitamin D supplementation was infrequent, when present at a sufficient dose it was associated with a very low level of hypovitaminosis D. Given hypovitaminosis

D remained prevalent for supplementation less than 1000 IU daily, baseline supplementation consistent with recommendations from the Endocrine Society (2000 IU daily) appears most effective in this population.

