

FACTORS AFFECTING VITAMIN D STATUS: EVALUATION OF A MIDUS COHORT

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The determinants of circulating vitamin D status are complex. Most reports find higher body mass index (BMI) and/or larger amounts of body fat to be associated with lower vitamin D status. Such relationships have led some to postulate that low vitamin D status causes obesity, not that obesity causes low vitamin D status. Clearly, an improved understanding of the relationship between body composition, and other potential variables, with vitamin D status is necessary. As such, the purpose of this report is to investigate relationships between body composition, as determined by total body DXA, parameters of socioeconomic status and circulating 25-hydroxyvitamin D {25(OH)D} in a subset of participants in MIDUS (Midlife in the US), a nationally representative cohort study of aging conducted at three US centers. In a MIDUS subset being evaluated at the University of Wisconsin, total body composition was determined using a GE Healthcare Lunar Prodigy densitometer and serum 25(OH)D was measured using HPLC. Data were analyzed by linear regression or factorial ANOVA. In this MIDUS cohort (n = 211; 64% female; 53% Black) the mean (range) age and BMI were 54.1 (38-86 years) 30.8 (17.1-51.6 kg/m²). Mean 25(OH)D concentration was 19.8 (4.0 - 58.7) ng/ml. Vitamin D inadequacy was extremely prevalent; using a cut-point of 30 ng/ml, 86% of this cohort had low vitamin D status. Serum 25(OH)D was lower (p < 0.0001) in Blacks than Caucasians, with no differences by sex. Higher BMI, total soft and lean tissue mass, as measured by DXA, were associated with lower 25(OH)D concentration (p 0.66). Educational level, as a surrogate for socioeconomic status was unrelated to BMI, lean or fat mass. However, serum 25(OH)D was higher in subjects with a college, or greater, education level (p < 0.05). In conclusion, these preliminary analyses suggest that lower vitamin D status is associated with greater amounts of body mass regardless of composition. Additionally, higher levels of education are associated with better vitamin D status. Further work is needed to improve understanding of the complex relationships contributing to an individual's vitamin D status.

WHO CAN PASS THE ISCD CLINICIAN BONE COURSE EXAMINATION? THE 8 YEARS EXPERIENCE IN TAIWAN

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Background: The International Society of Clinical Densitometry (ISCD) launched the Professional Certification program in early 1996 and was introduced to Taiwan by the Taiwanese Osteoporosis Association (TOA) in 2002. To disclose the determinants of passing the certification examinations would be valuable for improving the teaching skill of faculties and clinical excellence of professionals.

Methods: There are 13 Clinician Certification Course and Examinations (12 courses delivered by Chinese) during June 2002 to July 2009. A total of 732 subjects (M/F=621/111) were enrolled for analysis. The attendee were asked to complete a constructive application form with documented information (age, gender, hospital level, job level, hospital area, professional division, DXA-interpreting experiences, experiences of osteoporosis treatment) while registration. Subjects were dichotomized as either non-certified or certified groups and were statistically analyzed for the determinants of passing the course.

Results: The average certified rate was 75.3% (n=551). In univariate analysis, the age ($p<0.001$) and hospital level ($p<0.001$) showed significant differences between the two groups. Using the multivariate logistic analysis, only the age (OR=0.907, 95%CI:0.867-0.949, $p<0.001$) and clinical experience (attending physician vs resident, OR=3.210, 95%CI:1.215-8.485, $p=0.019$) were the independent factors for passing the course.

Conclusions: With the cooperation of TOA, the ISCD bone course has been successfully established in Taiwan. Only limited factors can influence the pass rate. Our findings reflect the solid content and efficient design of the course and support the recommendation for any professionals who have interest in the excellence of osteoporosis diagnosis and management.

ESTIMATING CALCIUM INTAKE AT TIME OF DUAL ENERGY X-RAY ABSORPTIOMETRY (DXA) SCAN

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BACKGROUND: Calcium intake, whether from diet or supplementation, is an important determinant of bone mass and an adjunct to all treatments for osteoporosis. Recommended daily allowance for calcium is 800 mg; for patients with osteoporosis on treatment a higher intake of 1200 mg is advocated. As part of our DXA service, we estimate calcium intake from dairy sources, which accounts for about 80% of dietary calcium intake.

METHODS: We studied our computerised records of estimated daily calcium intake in our DXA database over a 2 year period (n=5982) according to the following categories: women (premenopausal and postmenopausal) and men (under 50 years and over 50 years). We determined the frequency of subjects with estimated calcium intake below 400 mg/d, 800 mg/d and 1200 mg/d.

RESULTS: About 69% of adults have calcium intake below recommended intake of 800 mg/d. If patients had a diagnosis of osteoporosis, then about 90% would need a prescription for a calcium supplement in order to achieve a daily calcium intake in excess of 1200 mg/d.

CONCLUSION: An estimate of calcium intake should be made at the time of DXA testing in order to identify subjects who would benefit from advice about augmenting their dietary intake of calcium, and if necessary to make a suggestion to the referring clinician about prescribing calcium supplements.

Frequency of Calcium Intake Below Threshold				
Group	n	400 mg/d	800 mg/d	1200 mg/d
Premenopausal women	839	20%	69%	90%
Men (under 50)	299	15%	57%	84%
Postmenopausal women	4256	19%	70%	91%
Men (over 50)	594	25%	74%	91%
Total group	5982	20%	69%	91%

A RANDOMIZED CONTROLLED TRIAL TO ASSESS THE EFFECTIVENESS OF AN EVIDENCE-BASED GUIDELINE FOR THE PREVENTION OF OSTEOPOROSIS IN COMMUNITY HEALTH

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BACKGROUND: Effectiveness of evidence-based clinical guideline for the prevention of osteoporosis and osteoporotic fracture is not supported by hard evidence. We assessed whether an evidence-based guideline helped public health professionals improve their preventive programs for osteoporosis better than other information.

METHODS: We selected 262 local health centers from 1,978 centers throughout Japan which had planned to revise the programs for the prevention of osteoporosis in the following year, and asked them to participate in the present randomized controlled trial. We conducted a pre-intervention interview survey for 100 randomly-selected centers using a standardized questionnaire assessing how well the preventive measures provided by the centers were based on corresponding evidence. The centers were then randomly allocated to the intervention and control groups with a minimization method using geographical area, population and type of municipality as stratification factors. The health centers of the intervention group received several copies of the guideline booklet and were asked to revise their preventive programs by using the guideline. The centers of the control group were asked to revise their program with any information other than the guideline. We conducted the post-intervention assessment using the above-mentioned questionnaire by evaluators concealed about the allocation, and compared the change in level of evidence on which each item of the preventive programs was based during the intervention period between the intervention and control groups. Analyses were conducted on intention-to-treat basis.

RESULTS: 48 intervened and 48 control health centers completed the study. The guideline was actually used in 50% of the centers in the intervention group. Regarding advice on calcium intake or supplements and vitamin D intake, a significantly greater improvement was noted in the intervention group. A marked improvement was also observed in the intervention group in advice on physical training including brisk walking, vigorous exercise, stretching and moderate exercise, and training to strengthen the muscles of the lower body.

CONCLUSIONS: Introduction of the evidence-based guideline to local health centers facilitated the improvement in preventive measures for osteoporosis like calcium intake and exercise but not in all the measures. The guideline booklet is one of the valid tools to change present preventive programs to be evidence-based but seems not to be effective enough. We should develop various ways to promote communication between researchers and practitioners in evidence-based health care.

IMPROVING ADHERENCE TO ORAL BISPHOSPHONATES THROUGH FOCUSED TELEPHONIC PHARMACIST INTERVENTION

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BACKGROUND: Our study focused on understanding baseline performance levels and improving the adherence to oral bisphosphonates in patients with a history indicating non-adherence. In previously published studies, adherence to chronic medications has been reported to be approximately 50% after one year. For oral bisphosphonates, adherence has been found to be 53% after just 3 months. Our goal was to test the hypothesis that adherence could be improved via telephonic counseling and support by Medco Women's Health Specialist Pharmacists.

METHODS: The study was based on a patient population extracted from a national database managed by Medco Health Solutions, Inc., a pharmacy benefits management company, and home delivery pharmacy, that provides service to more than 60 million members nationwide. Medco's database includes pharmacy claims for more than 25 million members utilizing long term medications. For our study, we focused on female patients who had complete pharmacy claims information from 1/1/2008 to 12/8/2009 and who were dispensed at least 2 prescriptions from the Medco Pharmacy. Patients were identified as non-adherent based upon a medication possession ratio of less than 80% and being late to fill for the most recent claim. These patients were considered to have a gap in care. Two intervention strategies were deployed: 1) proactive telephonic outreach by Pharmacist and, 2) the offer of counseling when a patient called for other reasons. Pharmacist counseling covered the importance of osteoporosis drug therapy as well as identifying and addressing barriers to adherence including assistance with refilling a prescription if appropriate. We measured number of patients counseled and number of gaps closed. Gap closure was defined by evidence of a subsequent claim for the osteoporosis medication in question within 30 days of counseling.

RESULTS: We measured baseline adherence to oral bisphosphonates in the targeted population to be 76.3 %. We spoke with a total of 6649 patients, and as a result of Pharmacist counseling, we were able to close 3,602 adherence gaps in care.

(Poster will provide additional data analysis)

CONCLUSIONS: The use of pharmacy claims data is an effective way to identify patients who may require assistance. Telephonic counseling by Medco Women's Health Specialist Pharmacists resulted in improved adherence to oral bisphosphonates in women who were previously non-adherent. Pharmacists should be considered as important members of the healthcare team, especially in identifying and addressing barriers to adherence. Patients were found to be receptive to counseling by pharmacists with additional Women's Health training. In addition, the advantage of working in technologically advanced practice environment may also have contributed to our positive results.

MORE ACCURATE WEIGHT BASED FORMULA FOR VITAMIN D REPLACEMENT

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New More Accurate Weight Based Formula for Vitamin D Replacement

Background: Vitamin D deficiency has been recognized in the last decade as a very common problem affecting around one billion people worldwide. In addition to causing osteomalacia and low bone mineral density, it has been associated with muscle weakness, autoimmune disease as well as certain cancers. There is no recommended regiment for replacement of vitamin D deficiency. Doses in previous studies have varied from 800 IU up to 10,000 IU given once, daily, weekly or monthly. But in all of these studies, the achievement of target 25 hydroxyvitamin D (VitD) levels of more than 30 ng/ml (TARGET) was only 50-60%. In this study we compared 4 methods of estimating oral dose needed to achieve the TARGET.

Methods: Ninety one patients with low vitamin D levels were reviewed over a period of 2 years. The patients were replaced with variable number of ergocalciferol pills (50,000 unit / pill) (ERGO).

Depending on the number of pills used, the patients were classified into 4 different methods : 1) Fixed Method replaced the patients with 6 ERGO pills weekly. 2) Variable Method replaced the patients with ERGO dose depending on their baseline VitD levels (8 pills if baseline VitD was <10 , 6 pills if VitD between 10-19 and 4 doses if VitD is >=20 ng/ml. 3) Lean method used same number as the Variable method multiplied by a Lean Factor. 4) Ideal method used same number as the Variable method multiplied by an Ideal Factor. Lean factor and Ideal factors are calculated by dividing current weight by lean body weight and ideal body weight respectively.

Number of patients achieving TARGET was calculated in each group. Chi Square was used to compare the groups.

Results: TARGET was achieved in 57.1% in whole sample compared to 55.3, 55.6, 69.6 and 82.6% in fixed, variable, lean and ideal groups. Only Ideal method was significantly different from whole sample (p 0.004). Ideal method was also significant different from Variable and Lean methods (p 0.02 and 0.037 respectively)

Comparing Various Methods of Vitamin D Replacement					
	Whole Sample	Fixed	Variable	Lean	Ideal
No of Cases	91	38	45	23	23
Target achieved No (%)	52 (57.1)	21 (55.3)	25 (55.6)	16 (69.6)	19 (82.6)
p-value compared to Whole Sample		0.759	0.762	0.164	0.004*

Conclusion: The ideal method seems to be a very simple formula to replace vitamin D deficiency that takes into account 3 factors that affect the response to oral supplementation: baseline level, weight and sex. Our study shows that it is much more effective than other routinely used regimens.

We recommend its use especially in case where quick response is desired such as severe osteoporosis or weakness as well in all research involving vitamin D replacement.

ANDRAGOGY-THE MISSING GAP IN OSTEOPOROSIS PATIENT EDUCATION

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ANDRAGOGY-THE MISSING GAP IN OSTEOPOROSIS PATIENT EDUCATION

The purpose of this paper was to provide a review of the scholarly literature regarding the persistent problem of patient compliance. The importance of patient compliance with medication has been well documented across several chronic disease conditions. These compliance issues have been translated into economic costs as high as 80% of total United States health care costs. Osteoporosis is a chronic disease of measurable and deserved attention for efforts in improving patient compliance. National Osteoporosis Foundation estimates that the cost of osteoporosis fractures will total \$25.3 billion in 2025.

Over 50 articles were reviewed that covered the general topic of patient compliance in all chronic conditions, issues and current practices of patient education, in-depth reviews of osteoporosis compliance, and the socio-economic outcome of osteoporosis compliance issues. Research with strong efforts to affect patient outcomes has been conducted and published in the literature. The literature suggested minimal positive outcomes from those efforts which included physicians, nurses, pharmacists, and others as the educational conduit for treatment success. Other literature reviews conclude that up to 50% of osteoporosis patients did not take their medications as directed. Inundating healthcare providers with educational materials and responsibility for educating patients has produced few significant improvements.

Meanwhile, great strides have been made and documented in the adult educational field of andragogy. There is, however very little mention of, and no research found that utilizes accepted and proven methods of adult learning techniques to enhance patient compliance. The conclusion of this review was the identification of a need to re-evaluate the way patient compliance is achieved. Future studies of patient compliance in osteoporosis should not be focused on who the educator is, but who the patient is, by starting with the approach that the patient is an adult learner. The question for further study is: What impact does applying currently accepted adult learning techniques have on patient compliance and subsequent outcomes when utilized in educating the osteoporosis patient?

A COMPARISON OF CHANGES IN BMD IN A BONE HEALTH PLAN WITH TWO DIFFERENT VERSIONS OF A BONE HEALTH SUPPLEMENTS

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Background: This study compared BMD changes in a bone health plan with a different bone-health supplement. Method: 274 adults aged 18-25 received a DXA scan, 158 (Grp 1) volunteered to follow a bone-health plan with a supplement containing 680 mg strontium citrate and a plant-sourced 720 mg calcium supplement (AlgaeCal) with 72 mg of magnesium, 800 IU Vit D3, and 1.5 mg Vit K2 as MK-4. Upon completion of the study, a different group of 80 different (Grp 2) subjects followed the same procedure, 51 volunteered to follow the identical plan, but with a modified supplement containing 756 mg calcium, 350 mg magnesium, 1,600 IU Vit D3 and 100mcg of VitK2 as MK-7. Comparisons were made between baseline BMDs in: volunteers vs. non-volunteers, drop-outs vs. completers, and compliant vs. partially compliant subjects. Within-group changes in BMD were assessed in both groups between: baseline/ending, expected changes using national norms, and between compliant and partially compliant subjects. Comparisons of BMD changes between the two study groups were made in baseline/ending BMDs, partially compliant subjects, and compliant subjects. To evaluate safety, within-group comparisons were made between 43 baseline and ending blood chemistries and a self-reported quality of life inventory.

Results: No significant differences were found in baseline BMDs between the two study groups, and nor in baseline BMDs between volunteers vs. non-volunteers, or between drop-outs vs. completers. Both groups had increased BMD levels compared to: expected changes [Grp 1: 1.15%, $p=0.001$; Grp 2: 2.79%, $p=0.001$]; changes from baseline [Grp 1: 0.48%, $p=0.14$; Grp 2: 2.18%, $p<0.001$]; and compliant vs. partially compliant subjects [$p=0.001$ and $p=0.003$ respectively]. Grp-2 subjects had a greater increase in BMD than GRP 1 in: baseline/ending ($p=0.005$, partially compliant subjects ($p=0.005$) but, not in compliant subjects ($p=0.12$). No clinically significant changes in blood chemistries or self-reported quality of life were found within or between groups. Conclusion: In both study groups, following the bone-health plan led to increased BMDs compared to expected changes, between baseline & ending BMDs, and between compliant and partially compliant subjects--increases unaffected by volunteer bias or attrition. Modifying the nutritional composition of the bone-health supplement led to greater increases in BMD. No adverse effects were reported in either group.