TITLE: Vitamin D Supplementation in the Elderly and Long-Term Care Residents: Clinical Effectiveness and Guidelines for Use

DATE: 20 March 2009

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of Vitamin D supplementation in the elderly and long-term care residents?

2. What are the guidelines associated with use of Vitamin D supplementation in the elderly and long-term care residents?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, the Cochrane Library (Issue 4, 2008), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international HTA agencies, and a focused Internet search. Results include articles published between 2004 and March 2009 and are limited to English language publications only. Filters were applied to limit the retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, and guidelines. Internet links are provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS:

HTIS reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials (RCTs), and evidence-based guidelines.
Two meta-analyses, eight RCTs, and two guidelines were identified pertaining to the use of Vitamin D supplementation in the elderly and long-term care residents. No health technology assessments were identified. The main body of the report includes systematic reviews, RCTs, and evidence-based guidelines wherein the mean age of participants was clearly reported as being 60 years or older. Studies with mixed-age populations or where the age of the participants was not reported are included in the appendix. Also included in the appendix are additional articles that may be of interest.

OVERALL SUMMARY OF FINDINGS:

Systematic reviews and meta-analyses

Two meta-analyses pertaining to the use of vitamin D supplementation in older adults were identified; one to prevent fractures and the other to prevent falls.

With regard to fracture prevention, authors analyzed trials in which patients ≥60 years were supplemented with oral vitamin D (cholecalciferol) with and without calcium supplementation. Vitamin D doses of 700-800 IU per day reduced the relative risk of hip fractures and any non-vertebral fractures compared to calcium or placebo alone. No clinical benefit was observed when vitamin D supplementation of 400 IU per day was administered. Authors concluded that in an ambulatory or institutionalized elderly population, 700-800 IU per day vitamin D supplementation appears to reduce the risk of hip and non-vertebral fracture.

A meta-analysis by the same authors assessed the effectiveness of vitamin D in preventing falls in older adults (≥60 years). No dosing range was reported in the abstract, but vitamin D reduced the risk of falls compared to patients taking either placebo or calcium. They found that in order to prevent one fall, 15 patients would need to be treated with vitamin D supplements. Authors concluded that in an ambulatory or institutionalized elderly population, vitamin D reduces the risk of falling by more than 20%.

Randomized controlled trials

Of the eight RCTs identified, six evaluated the effectiveness of vitamin D supplementation for the reduction of falls and four for the reduction of fractures.

A vitamin D dose of 1000 IU per day was found to be effective in preventing falls in two studies. The first study included older women aged 70 to 90 years who lived in the community and who received either 1000 IU of ergocalciferol per day or placebo. Follow-up data were collected every 6 weeks for one year. Vitamin D therapy reduced the risk of having at least one fall over one year but did not reduce the risk of falling more than once. In the second study, both men and women in residential care (mean age 83.4) were supplemented with 1000 IU of ergocalciferol per day or placebo and were followed for two years. Authors found that two years of vitamin D supplementation resulted in reduced incidence of falls in older adults in residential care.

One trial studied the effect of vitamin D supplementation at a dose of 700 IU per day on reducing falls in men and women ≥65 years who were living at home. Participants were randomized to vitamin D (cholecalciferol) plus calcium or placebo and were followed up for three years. Vitamin D supplementation reduced the odds of falling in women, but not in men. Long-term supplementation reduced the odds of falling by 46% in ambulatory older women and by 65% in less active ambulatory women.
Once study reported mixed conclusions regarding the effect vitamin D supplementation on fall prevention in older adults.\textsuperscript{10} This study differed from other included studies in that investigators studied the use of a single intramuscular injection of either 600,000 IU vitamin D (ergocalciferol) or placebo in ambulatory subjects ≥65 years with a history of falling.\textsuperscript{10} Although there was no significant difference in the number of falls or people falling in the two groups, the authors concluded that vitamin D supplementation has a beneficial effect on functional performance and reaction time, and that this improvement might reduce falls. This was not tested.

Two studies found that vitamin D supplementation had no effect on reducing falls in older adults.\textsuperscript{4,6} The first study found that vitamin D at a dose of 800 IU per day did not significantly reduce the number of falls or fallers in a group of geriatric inpatients.\textsuperscript{4} The second study took place in residential care units and administered vitamin D doses of 1,100 IU per day (administered as 2.5mg every three months).\textsuperscript{7} Patients were followed for 10 months and authors found no evidence that the vitamin D supplementation prevented falls in elderly people in care homes.

None of the included RCTs found vitamin D supplementation to be effective in preventing fractures in elderly populations.\textsuperscript{6,8-10} Doses used in these studies were 2.5mg every 3 months (equivalent to 1,100 IU per day),\textsuperscript{6} 800 IU per day,\textsuperscript{8,9} and a single intramuscular injection of 600,000 IU per day. The duration of the studies ranged from 6 months\textsuperscript{10} to just over 5 years,\textsuperscript{8} and took place both in the community\textsuperscript{8-10} and in residential care.\textsuperscript{6} No study pertaining to either fractures or falls reported any adverse effects of vitamin D supplementation.

**Guidelines and recommendations**

Two guidelines were identified that issued recommendations on vitamin D supplementation to prevent falls and fractures.\textsuperscript{11,12}

The recommendation statement from the Canadian Task Force on Preventative Health states that for women without osteoporosis, there is fair evidence that vitamin D supplementation prevents osteoporotic fractures.\textsuperscript{12} Supplementation of 400-800 IU per day is recommended for all postmenopausal women (see Figure 1 in the guideline).

The National Institute for Health and Clinical Excellence guideline states that the combination of vitamin D3 and calcium supplementation has been found to reduce fracture rates in older people residing in assisted care.\textsuperscript{11} They state that although there is emerging evidence that vitamin D may reduce the risk of falling, there is still some uncertainty (especially about route of administration and dosing) and thus they cannot make a firm recommendation about the indication.

Overall, there is mixed evidence regarding the vitamin D supplementation for the reduction of falls and fractures in older adults. Long-term supplementation with dose of 1000 IU per day seems to be beneficial in preventing falls in both community dwelling\textsuperscript{3} and residential care\textsuperscript{7} populations. Supplementation in doses of 700-800 IU per day may reduce the risk of hip and non-vertebral fracture in an elderly residential population according to the included meta-analysis,\textsuperscript{1} but none of the included RCTs found evidence to support vitamin D supplementation to reduce the incidence of fractures in the elderly.\textsuperscript{6,8-10} Both guidelines, however, recommended vitamin D supplementation to reduce fractures.\textsuperscript{11,12} Although only one abstract reported any safety information,\textsuperscript{8} safety data may have been recorded in other studies and may be available in the full text reports.
REFERENCES SUMMARIZED:

Health technology assessments
No literature identified

Systematic reviews and meta-analyses


Randomized controlled trials


Guidelines and recommendations

   See pg 13 section 1.12.5


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APPENDIX – FURTHER INFORMATION:

Guidelines


Studies in which the mean age was not reported


Studies investigating a mixed-age population


Studies in which outcomes are ambiguous


Secondary analyses
