General Practice registrars ordering of Vitamin D tests

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Background

• Increasing requests for Vitamin D measurement

➤ Australia - $1 million in 2000 to $95.6 million in 2010
Vitamin D Revealed to be Miracle Anti-Cancer 'Drug' with Astonishing Chemical Properties

Vitamin D cuts risk of death from heart failure - new study

• Only proven causal link bone health & falls
Increasing requests for vitamin D measurement: costly, confusing, and without credibility

“Sunbathing boosts men’s sex drives” proclaimed newspaper reports. This headline was extrapolated from a cross-sectional study showing that serum 25-hydroxyvitamin D (25OHD) concentrations—a biochemical measure of vitamin D status—correlate to circulating testosterone concentrations in men referred for angiography, but neither sun exposure nor sex drive was directly assessed. This anecdote epitomises what has become a bandwagon of vitamin-D-related epidemiological research fuelling easily accessible headlines in lay media. Such frequent and prominent headlines have cast vitamin D in the role of a putative miracle cure that can prevent and treat a burgeoning list of chronic disorders such as cardiovascular disease, diabetes, and cancer.

This media coverage has caused a massive rise in demand for measurement of blood concentrations of 25OHD from the public and physicians. Glasgow Royal Infirmary—the main provider of 25OHD tests in Scotland—has seen a rise in vitamin D test requests from 18,682 in 2008, to 37,830 in 2010, which has resulted in a longstanding backlog of 2000 tests.

Patient in the UK attending a general practitioner in winter is therefore likely to be vitamin D insufficient (serum concentrations <50 nmol/l) or deficient (serum concentrations <25 nmol/l). But how should general practitioners interpret such test results? The key question is: does knowing the result usefully improve clinical practice and patient wellbeing?

To address this issue, whether vitamin D inadequacy has a predisposing relation with health consequences that could be avoided by intervention (eg, supplementation, diet, or sun exposure) needs to be established. Most evidence promoting a role for vitamin D in chronic disease has been extrapolated from epidemiological studies, but these results are often limited by factors such as potential reverse causality and residual confounding—particularly relevant limitations for vitamin D as a biomarker of health (table). Therefore, any conclusions about causality extrapolated from observational data are premature.

The only reliable tests of causality are randomised trials. The effectiveness of vitamin D supplementation in rickets and osteomalacia has been proven.
Why the concern??

• Vitamin D testing:
  ➢ Lacks reliability
  ➢ Validity has been challenged
  ➢ Clinical utility??
• Current Guidelines:
  – Recent Nth American guidelines

1.0 Diagnostic procedure
1.1 We recommend screening for vitamin D deficiency in individuals at risk for deficiency. We do not recommend population screening for vitamin D deficiency in individuals who are not at risk (1|0|0|0|0).

There is no evidence demonstrating benefits of screening for vitamin D deficiency at a population level. Such evidence would require demonstration of the feasibility and cost-effectiveness of such a screening strategy, as well as benefits in terms of important health outcomes. In the absence of this evidence, it is premature to recommend screening at large at this time.
| TABLE 2. Indications for 25(OH)D measurement (candidates for screening) |

- Rickets
- Osteomalacia
- Osteoporosis
- Chronic kidney disease
- Hepatic failure
- Malabsorption syndromes
  - Cystic fibrosis
  - Inflammatory bowel disease
  - Crohn’s disease
  - Bariatric surgery
  - Radiation enteritis
- Hyperparathyroidism
- Medications
  - Antiseizure medications
  - Glucocorticoids
  - AIDS medications
  - Antifungals, e.g. ketoconazole
  - Cholestyramine
- African-American and Hispanic children and adults
- Pregnant and lactating women
- Older adults with history of falls
- Older adults with history of nontraumatic fractures
- Obese children and adults (BMI > 30 kg/m²)
- Granuloma-forming disorders
  - Sarcoidosis
  - Tuberculosis
  - Histoplasmosis
  - Coccidiomycosis
  - Berylliosis
  - Some lymphomas
Aims/Objectives

• Establish levels and associations of GP registrars’ Vitamin D test ordering

• Associations assessed:
  ➢ Patient Factors
  ➢ Registrar Factors
  ➢ Consultation Factors
Methods

• ReCEnT – Registrar Clinical Encounters in Training Study
• Longitudinal, ongoing cohort study
• Registrar and Practice Characteristics collected
• Registrars in Terms 1, 2, 3 & 4 to record 60 consecutive consultations in clinical practice
• Data analysed from collection rounds in 2010-2011
Methods

• % consultations:
  - Vitamin D levels requested
  - Vitamin D co-ordered with lipid profile

• Diagnosis/problem when test was ordered
  - Coded with ICPC2-Plus

• Associations were tested with Chi-square and Mann-Whitney tests
Results

- 207 registrars (response rate 95%)
- 383 registrar-rounds
  - 41% Term 1
  - 34% Term 2
  - 25% Term 3/4
- 22,844 consultations
Results

• Vitamin D was ordered in 1.3% (CI 1.1%-1.4%) of consultations

• 39% (CI 33.2%-44.4%) of these Vitamin D tests were co-ordered with lipid profile
Results

• Problem/diagnosis when Vitamin D test was ordered:
  ➢ 10.6% vitamin deficiency
  ➢ 5.1% osteoporosis
  ➢ 5.5% weakness/tiredness
  ➢ 2.3% pregnancy
  ➢ 23.4% medical exam or check-up
    ➢ 35.1% when co-ordered with lipids
Significant patient associations of greater Vitamin D ordering:

<table>
<thead>
<tr>
<th>Association</th>
<th>Significance</th>
<th><strong>Female Patients</strong></th>
<th><strong>Male</strong></th>
<th><strong>Older Patients (Mean age)</strong></th>
<th><strong>Non-English Speaking Background</strong></th>
<th><strong>New Patient to Surgery</strong></th>
<th><strong>New Patient to Registrar</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>1.69%</td>
<td>Male</td>
<td>0.59%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Patients</td>
<td>***</td>
<td>Male</td>
<td>0.59%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Older Patients (Mean age)</td>
<td>****</td>
<td>Test ordered</td>
<td>48.6 yrs</td>
<td>No Test Ordered</td>
<td>40.4 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-English Speaking Background</td>
<td>***</td>
<td>Yes</td>
<td>4.1%</td>
<td>No</td>
<td>1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>1.2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Patient to Surgery</td>
<td>***</td>
<td>New</td>
<td>2.3%</td>
<td>Returning</td>
<td>1.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Patient to Registrar</td>
<td>**</td>
<td>New</td>
<td>1.5%</td>
<td>Returning</td>
<td>1.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**** p-value<0.0001  *** p-value<0.001   ** p-value<0.01
Significant consultation associations of greater Vitamin D ordering:

<table>
<thead>
<tr>
<th>Association</th>
<th>Vitamin D test ordered</th>
<th>No test ordered</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longer Duration</td>
<td>Mean length</td>
<td>22.8 min</td>
<td>16.6 min</td>
</tr>
</tbody>
</table>

**** p-value<0.0001
Significant registrar associations of greater Vitamin D ordering:

<table>
<thead>
<tr>
<th>Association</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Registrar</td>
<td>***</td>
</tr>
<tr>
<td>Term 1 &amp; 2</td>
<td>***</td>
</tr>
<tr>
<td>Term 3 &amp; 4</td>
<td>***</td>
</tr>
<tr>
<td>Younger Registrar (Mean age)</td>
<td>***</td>
</tr>
<tr>
<td>Place of Qualification</td>
<td>**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Association</th>
<th>Female</th>
<th>Male</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Registrar</td>
<td>1.46%</td>
<td>0.9%</td>
<td>***</td>
</tr>
<tr>
<td>Earlier in Training</td>
<td>1.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term 3 &amp; 4</td>
<td>0.6%</td>
<td></td>
<td>***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Association</th>
<th>Mean Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger Registrar (Test Ordered)</td>
<td>32.1yrs</td>
</tr>
<tr>
<td>Younger Registrar (No Test Ordered)</td>
<td>33.8yrs</td>
</tr>
</tbody>
</table>

*** p-value<0.001  ** p-value<0.01
Vitamin D co-ordered with lipids associations:

<table>
<thead>
<tr>
<th>Association</th>
<th>Significance</th>
<th>Test Co-ordered</th>
<th>Test not co-ordered</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older Patient (mean age)</td>
<td>***</td>
<td>53.5 yrs</td>
<td>45.44</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>New Patient to Surgery</td>
<td>*</td>
<td>54.1%</td>
<td>36.7%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Non English Speaking Background</td>
<td>**</td>
<td>42.1%</td>
<td>18.4%</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

*** p-value<0.001 ** p-value<0.01 * p-value<0.05
Discussion

• Incidence of testing – comparison??
• How much is consistent with guidelines??
  – Are the problems/diagnoses that testing occurs for appropriate?
  – Targeting higher risk patient to some degree
• Suggestions of non-targeted/indiscriminate ordering
Where to from here??

• Educational Aspects
  – Results to inform educational intervention?
  – Further multivariate analysis
Maybe my blood sugar will start to fall too!