

Vitamin D Testing and Management - Maternity Patients and Newborns



1. Purpose

This clinical guideline supports the testing and management of vitamin D deficiency in pregnant women at the Women's, and the early management of their infants.

2. Definitions

Vitamin D deficiency is a state of insufficient vitamin D to meet the body's requirements.

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists and recent consensus guidelines recommend the following classification of vitamin D status in pregnancy (1,2).

- Sufficiency: 25(OH)D >50 nmol/L
- Insufficiency: 25(OH)D between 30 nmol/L to 50 nmol/L
- Deficiency: 25(OH) D <30 nmol/L

3. Responsibilities

Obstetricians, obstetric fellows, registrars and residents, general practitioners, midwives, lactation consultants, pharmacists and dietitians should be guided by this policy in their testing and management of vitamin D deficiency in pregnant women at the Women's, and the early management of their infants.

4. Background information

Vitamin D is essential in the maintenance of skeletal growth and bone health – vitamin D regulates calcium and phosphate absorption and metabolism. Vitamin D is a fat-soluble vitamin that can be obtained from food or dietary supplements however, most vitamin D is produced by direct exposure of unprotected skin to the sun. Vitamin D is produced in the body through the conversion of 7-dehydrocholesterol in the sebaceous glands of the skin. Exposure to sunlight (UVB) converts this precursor into cholecalciferol over a 2-3 day period.

Serum 25-hydroxyvitamin D (25-OHD) reflects the vitamin D derived from all sources and is considered to be an indicator of the individual's vitamin D status. Supplementation during pregnancy increases maternal serum vitamin D concentrations, and maternal 25-hydroxy vitamin D levels are reflected in the fetus at term.

In the UK and US, recommendations state the daily intake required for 97.5% of the population (including pregnant and breastfeeding women) with minimal sun exposure to maintain a vitamin D concentration above 25 nmol/L is 400IU per day (3, 4). Current Australian consensus recommendations are based on these reference intakes as the 2006 nutrient reference values for Australia have been recognised as being out of date (5).

Women who are vitamin D insufficient or deficient are usually asymptomatic. Insufficient quantities of vitamin D are associated with osteomalacia and an increased risk of osteoporosis (5). Children with severe vitamin D deficiency are at risk of hypocalcaemic seizures and nutritional rickets (2).

Vitamin D deficiency has been associated with several maternal and neonatal adverse outcomes including gestational diabetes, preterm birth and pre-eclampsia. However, systematic reviews and high quality RCTs do not currently support that universal Vitamin D supplementation improves maternal or neonatal outcomes. (6-9)

5. Guideline

5.1 Screening and Assessment

Vitamin D testing is not routine in pregnancy. The Medical Benefits Schedule (MBS) restricts the testing of Vitamin D levels to certain high-risk groups (10). The high risk groups, under MBS criteria, that are most relevant to pregnant women are:

- *deeply* pigmented skin, or

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- chronic *and* severe lack of sun exposure for cultural, medical, occupational or residential reasons, or
- malabsorption (e.g., cystic fibrosis, short bowel syndrome, inflammatory bowel disease, untreated coeliac disease or a history of bariatric surgery).

For pregnant women at high risk of Vitamin D deficiency, levels should be tested at least once in pregnancy by their GP or at their first antenatal hospital visit, and vitamin D supplementation adjusted accordingly with the result.

5.2 Treatment of vitamin D deficiency

The following vitamin supplementation should be recommended according to a woman's vitamin D test results (11):

25OHD Level	Treatment Dose	Maintenance Dose*
30-50 nmol/L	1000 IU daily for 3 months	1000 IU daily
<30 nmol/L	2000 IU daily for 3 months	1000 IU daily

*at least to the end of breastfeeding

Various preparations of multivitamin and Vitamin D supplements are listed in Appendix 2.

5.3 Prevention of vitamin D deficiency

General Advice for all women

1. Universal supplementation of Vitamin D

Universal supplementation of pregnant women with 400 to 600 IU per day of vitamin D individually or as part of a pregnancy multivitamin is recommended (1,11,12). Women are advised to check the vitamin D content of their pregnancy multivitamin as content varies and additional vitamin D supplementation may be required (see Appendix 2).

2. Advice to increase safe sun exposure

For moderately fair-skinned people, a walk with arms exposed for 6–7 minutes mid-morning or mid-afternoon in summer, is likely to be helpful in maintaining adequate vitamin D levels in the body. In winter months as much bare skin exposed as feasible for 7–40 minutes (depending on latitude) at noon, on most days, should achieve adequate vitamin D levels in the body (5).

3. Advice to increase food intake of vitamin D

Dietary sources of vitamin D include oily fish, eggs, and fortified foods such as margarines and some milk products. These foods contain only small amounts of vitamin D.

4. Advice to ensure adequate calcium supplementation

Sufficient quantities of calcium can be provided through dietary sources alone. Milk, cheeses and yoghurt provide rich natural sources of calcium and are the major food contributors of calcium. Non-dairy sources include Asian greens, tinned sardines and salmon, sesame seeds and almonds. Spinach provides calcium, but its bioavailability is poor. Foods available fortified with calcium include many fruit juices and drinks, tofu, and cereals.

NHMRC RDI for calcium in pregnancy is 1000 mg/day (13). Calcium supplementation is available if unable to reach recommended daily intake through diet alone. Calcium tablets contain varying quantities of calcium, most between 500 mg to 600 mg calcium per tablet. Multivitamins (including antenatal vitamins) also include calcium but in smaller quantities (see Appendix 2).

5. Advice to consider needs of other family members

For other family members of vitamin D deficient mothers or who are high risk for vitamin D deficiency, similar principles apply with respect to safely increasing sun exposure and food intake of vitamin D where possible

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5.4 Vitamin D retesting

Retesting of vitamin D is not advised and is not the policy of the Royal Women's Hospital.

5.5 Vitamin D supplementation for infants

All babies, regardless of gestation, birth weight, or method of feeding, should be supplemented with 400 IU Vitamin D per day for at least the first 12 months of life (1,11,12).

Even if a mother is vitamin D deficient, babies are not routinely required to have their vitamin D levels checked. Although the superior source of infant nutrition, breastmilk is an inadequate source of vitamin D and exclusive breastfeeding is a potential risk factor for neonatal rickets.

Infant formula is fortified with vitamin D, however daily intake is unlikely to meet the recommended adequate intake. Supplementation of an additional 400 IU for formula fed babies is safe and may reduce maternal perception that breastmilk is inadequate.

Vitamin D drops for babies are available from pharmacies without a prescription. Further information is available in the Vitamin D Supplementation for Babies fact sheet.

Length of supplementation: Supplementation should occur for at least the first 12 months of life. It should be noted that the child may share risk factors of a vitamin D deficient mother and this should be addressed holistically by the family's GP.

6. Follow-up and Communication with GPs

It should be noted that if a woman is vitamin D deficient, her baby and the rest of her family may share risk factors.

All women with vitamin D deficiency should be advised to follow up with their GP for the lifelong management of her and her family.

For women who have been tested and found to have levels < 50 nmol/l in pregnancy, discharge summaries to a woman's GP should include vitamin D deficiency as a secondary diagnosis, her vitamin D status and the planned management of her and her baby.

7. Evaluation, monitoring and reporting of compliance to this guideline

Compliance with this guideline will be monitored, evaluated and reported through the team leader's management meeting. Outcomes will be measured by review of incidents, and periodically auditing the compliance with the guideline.

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8. References

1. RANZCOG. Vitamin and Mineral Supplementation and Pregnancy, November 2019: Microsoft Word - Vitamin and mineral supplementation in pregnancy (C-Obs 25)
2. Siafarikas A, Simm P, Zacharin M, Jeffries C, Lafferty A.R et al. Global consensus on nutritional rickets: Implications for Australia. J Paed Child Health 2020, 56: 841-846
3. The Scientific Advisory Committee on Nutrition (SACN). SACN Vitamin D and health report 2016
4. Ross CA, Taylor CL, Yaktine AL, Del Valle HB. Dietary reference intakes for calcium and vitamin D. IOM Committee to Review Dietary Reference Intakes for Calcium and Vitamin D. Washington: National Academies Press. 2010
5. Nowson CA, McGrath JJ, Ebeling PR, Haikerwal A, Daly RM et al. Vitamin D and health in adults in Australia and New Zealand: a position statement.. Med J Aust 2012; 196 (11): 686-687
6. Roth DE, Leung M, Mesfin E, Qamar H, Watterworth J, Papp E. Vitamin D supplementation during pregnancy: state of the evidence from a systematic review of randomised trials, BMJ. 2017; 359: j5237.
7. Roth DE, Gernand AD, Mahmud A. Vitamin D Supplementation in Pregnancy and Lactation and Infant Growth, N Engl J Med. 2018; 379(19): 1881.
8. Cooper C, Harvey NC, Bishop NJ, Kennedy S, Papageorgiou AT, Schoenmakers I, et al. Maternal gestational vitamin D supplementation and offspring bone health (MAVIDOS): a multicentre, double-blind, randomised placebo-controlled trial, Lancet Diabetes Endocrinol. 2016; 4(5): 393-402.
9. Tan ML, Abrams SA, Osborn DA. Vitamin D supplementation for term breastfed infants to prevent vitamin D deficiency and improve bone health. Cochrane Database of Systematic Reviews 2020, Issue 12. Art. No.: CD013046
10. Australian Government. Department of Health. MBS Online. Medicare Benefits Schedule - Item 66833: Item 66833 | Medicare Benefits Schedule (health.gov.au)
11. Paxton GA, Teale G.R, Nowson C.A, Mason R.S, McGrath J.J, Thompson MJ, Siafarikas A, Rodda, C.P, Munns. Vitamin D and health in pregnancy, infants, children and adolescents in Australia and New Zealand: a position statement. CF Med J Aust 2013; 198, 142 -143
12. Munns C.F, Shae N, Kiely M, Specker B.L, Thacher T.D et al. Global consensus recommendations on prevention and management of nutritional rickets. JCEM 2016, 101 (2): 394-415
13. Nutrient Reference Values for Australia and New Zealand. NHMRC. Updated September 2017. [Nutrient Reference Values for Australia and New Zealand Including Recommended Dietary Intakes \(nhmrc.gov.au\)](http://www.nhmrc.gov.au)

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9. Legislation/Regulations related to this guideline

Not Applicable

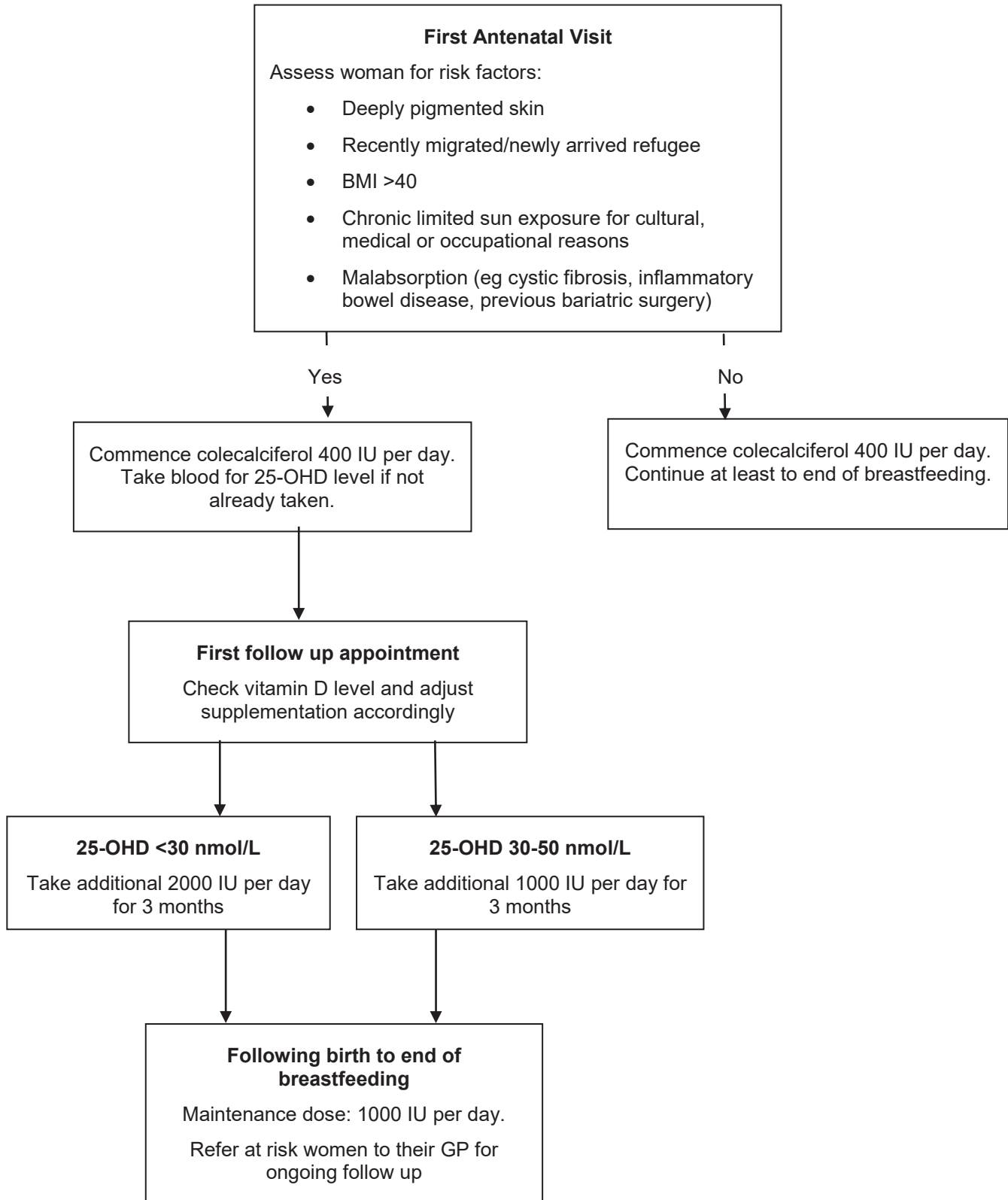
10. Appendices

Appendix 1: [Flowchart 1: Management of Vitamin D Status in Pregnancy](#)

Appendix 2: [Vitamin D and Calcium Content of Common Pregnancy Multivitamin Supplements](#)



Flowchart 1: Management of Vitamin D Status in Pregnancy



Appendix 2

Vitamin D and Calcium Content of Common Pregnancy Multivitamin Supplements



	Pregnancy Multivitamin Supplements with Vitamin D and Calcium											Vitamin D and Calcium Supplements					
	NRV Pregnancy (19-50yo)	Deva Vegan Prenatal	Elevit	Bioceuticals InNatal + iron	Blackmores Pregnancy & Breastfeeding Gold	Eagle Tresos Natal	Fabfol Pregnancy	Fefol Multi-preg	Herbs of Gold Pregnancy Plus 1-2-3	Swisse Ultinatal	Vitabiotics Pregnacare (UK)	Ostelin	Ostelin + Calcium	Ostevit D	Swisse Calcium + Vitamin D	Caltrate	Citracal + Vitamin D
Cholecalciferol D3 (mcg) [IU]	5 [200]	400 (D2)	200	500	500	1000	200	500	500	500	400	1000	500	1000	333	500	200
Calcium (mg)	1000	100	125	25	50	50		100	26.7	25		-	600	600	333	600	250
Dose per Day		1	1	2	2	1	1	1	2	2	1	1	1	1	2 to 3	1 to 2	1 to 2