

South Australian Paediatric Clinical Guidelines

Vitamin D deficiency

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Note:

This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach.

Information in this statewide guideline is current at the time of publication.

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The clinical material offered in this statewide standard/policy provides a minimum standard, but does not replace or remove clinical judgement or the professional care and duty necessary for each specific patient case. Where care deviates from that indicated in the statewide guideline contemporaneous documentation with explanation must be provided.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for:

- > Discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary,
- > Advising consumers of their choice and ensuring informed consent is obtained,
- > Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- > Documenting all care in accordance with mandatory and local requirements

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Introduction

- > Vitamin D plays an essential role in calcium metabolism, bone growth and mineralisation
- > Around 90 % of our vitamin D requirement comes from exposure of the skin to sunlight. The average diet contains only about 10 % of our requirements – insufficient to prevent vitamin D deficiency (Nozza and Rodda 2001)
- > The highest rates of vitamin D deficiency occur in dark-skinned, veiled, pregnant women (80 %), with similarly high rates found in mothers of infants treated for rickets (Nowson and Margetison 2002; Diamond et al. 2005)
- > Women with darker skin produce less vitamin D for a given sunlight exposure (Grover and Morley 2001; McCullough 2007)
- > Vitamin D deficiency in mothers is the most important causative factor for vitamin D deficiency in infants (Munns et al. 2006)

Food sources of Vitamin D

- > Few foods contain significant amounts of vitamin D (e.g. fish with a high fat content such as salmon, tuna, herring, mackerel and sardines). Other sources include meat, milk and eggs
- > In Australia, some margarine, milk and milk products are fortified with vitamin D (Nowson and Margetison 2002)
- > Breast milk is an inadequate source of vitamin D (0.15 micrograms / 100 mL) in the absence of exposure of the baby to sunlight. Infant formulas are supplemented with vitamin D and will provide an adequate dietary intake of vitamin D where daily intake is at least 500 mL

Other sources of Vitamin D

- > The optimum route of vitamin D intake is via skin exposure
- > However, deliberate sun exposure between 10.00 a.m. and 2.00 p.m. in summer (11.00 a.m. and 3.00 p.m. daylight saving time) is not advised. (Diamond et al. 2005)
- > It has been shown that whole body exposure to 10-15 minutes of midday sun in summer (about 1 minimal erythral dose [MED] or the amount of sun exposure that just produces a faint redness of skin) is comparable to taking 15,000 IU (375 micrograms) of vitamin D (cholecalciferol) orally (Diamond et al. 2005)
- > On this basis, exposure of hands, face and arms (around 15 % of body surface) to around 1/3 MED should produce around 1000 IU of vitamin D (cholecalciferol) for people with moderately fair skin (Diamond et al. 2005)
- > Exposure times for people with highly pigmented skin would be 3-4 times greater (Diamond et al. 2005)

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Vitamin D deficiency in pregnancy

Vitamin D status is measured as the serum level of 25-hydroxy vitamin D. Other indicators of vitamin D deficiency are rises in serum parathyroid hormone (PTH) and bone turnover markers. These changes begin to appear at serum 25OHD values below 61 nmol/L (Jesudason et al. 2002). Starting from that value, the following classification has proved useful to Adelaide specialists:

- > Mild vitamin D deficiency
 - > Serum 25OHD levels of 41 to 60 nmol/L
- > Moderate vitamin D deficiency
 - > Serum 25OHD levels of 26 to 40 nmol/L
- > Severe vitamin D deficiency
 - > Serum 25OHD levels below 26 nmol/L

Women with vitamin D deficiency are at risk of:

- > Osteomalacia
- > Accelerated osteoporosis due to secondary hyperparathyroidism
- > Muscle weakness

Babies of women with vitamin D deficiency during pregnancy are at risk of

- > Hypocalcaemia
- > Rickets
- > Myopathy
- > Reduced intrauterine long bone growth (Morley et al. 2006)

There is increasing evidence that vitamin D regulates many other biological processes (Gillie 2004) so vitamin D deficiency may have other consequences as yet undefined

Antenatal screening and treatment

- > Pregnant women at risk of vitamin D insufficiency (see below) are to be offered vitamin D screening at booking. They include:
 - > All veiled women e.g. Muslim, including those wearing headscarves
 - > Darker skinned women e.g. Aboriginal, North African, Indian and Sri Lankan
 - > Newly arrived refugees
 - > Anyone housebound for any reason

First appointment (booking) screening of at risk women

- > Request blood 25-hydroxy vitamin D level
- > Commence one tablet of 25 mcg Ostelin® daily or OsteVit-D containing vitamin D3 (cholecalciferol) 1000 units (which may be obtained without prescription at most pharmacies)

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First follow-up of at risk women

- > Check the report of the original 25OHD assay at the next appointment

< 26 nmol/L

- > Repeat 25OHD level to see if it has normalised.
- > Continue vitamin D 1,000 units daily

26 nmol/L – 60 nmol/L

- > Repeat 25OHD level to see if it has normalised
- > Continue vitamin D 1000 units daily

> 60 nmol/L

- > Discontinue vitamin D

Subsequent follow-up of at risk women

Depending on the second 25OHD assay:

If 25OHD > 60 nmol/L

- > Continue vitamin D 1,000 units daily

If 25OHD < 60 nmol/L

- > Increase dose to vitamin D 2,000 units daily

Discharge

- > All at risk women require a follow-up letter to their General Practitioner with a recommendation for a repeat 25OHD assay at 6 months and vitamin D should be resumed if indicated

Neonatal management

- > Breast milk fed infants of veiled or dark skinned mothers, mothers who are housebound or who are recently arrived refugees should be routinely supplemented with a daily dose of 400 IU of vitamin D (0.45 mL of Pentavite) until at least 12 months of age (Munns et al. 2006)

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