Summary of Vitamin D Recommendations

Group	Sunlight Exposure Advice	Supplementation Advice	Recommended Dose	Food Considerations	Other Considerations
Pregnancy					
General Population	Adhere to the Cancer Council of Australia guidelines.[1]	No evidence to support routine vitamin D supplementation for all pregnant women. Consider supplementation if deficient (see below for recommendations).	N/A	-	-
High Risk Populations *Veiled/dark skinned, commission flat residents, sun avoiding Asian women.*	No specific guidelines. Adhere to the Cancer Council of Australia guidelines.[1]	Screen for vitamin D deficiency during early pregnancy (first trimester) and provide supplements if necessary. Large dose advised during pregnancy if severely vitamin D deficient.	Supplement with 400 IU/d if mildly deficient.[2] (NB: many believe that this group should be supplemented with at least 1000 IU/d until proved sufficient). If moderately to severely deficient, treat with 3000 to 5000 IU/d until serum 25(OH)D ≥ 50 nmol/L. Once achieved, continue with 400 IU daily. [2]	Cultural practices and beliefs. Poor compliance, but little information available.	Fish liver oils are best avoided because they contain large doses of vitamin A, which has been linked to fetal abnormalities.

Summary of Vitamin D Recommendations

Group	Sunlight Exposure Advice	Supplementation Advice	Recommended Dose	Food Considerations	Other Considerations
Infancy					
General Population	Cancer Council of Australia recommends keeping infants out of direct sunlight as much as possible, especially between 10am and 4pm.[3]	Variable recommendations throughout the world. In Australia, there is insufficient evidence to support supplementation of 'low risk' infants in the general population.	N/A	Breast milk is a poor source of vitamin D. Breast fed babies are at increased risk of vitamin D deficiency compared to formula fed babies because formula contains vitamin D.	Currently no data regarding rates of vitamin D deficiency in the population. Possible link between vitamin D supplementation and immune/atopic diseases (eg asthma, cancer) and type 1 diabetes. Little information on the long-term health effects on vitamin D deficiency prenatally or into infancy/childhood (controversial).
High Risk Population *Infants of veiled/dark skinned women especially breast fed*	No specific guidelines. Adhere to the Cancer Council of Australia guidelines.[1]	Breast fed infants of veiled or dark skinned mothers should consider supplementation.[2] Large dose at birth – one off dose given, needs to be repeated at 4-6 weeks.	Supplement with 400 IU/d (eg. 0.45 ml pentavite) until at least 12 months of age.[2] 50,000 IU of cholecalciferol at birth (In Australia, large vitamin D doses are not commercially available).		Potential risk of Vitamin A overdose if excessive amounts given, or if given together with formula milk
Children and Adolescents					
General Population	Adhere to the Cancer Council of Australia guidelines.[1]	Not necessary to supplement all children. Consider supplementation if deficient (see below for recommendations).	N/A	Non-routine dietary patterns. Physical activity recommendation to increase within Cancer Council of Australia guidelines.	Obesity and physical activity linked to vitamin D levels. More research required. Need to increase awareness and understanding within the school environment. NZ has good population data on the vitamin D status of children (and by race). NO INFORMATION FOR AUSTRALIANS.
High Risk Population *Dark skinned, veiled, disabled, limited sun exposure.*	Cancer Council of Australia advises hats, but no sunscreen for dark skinned children at pre-school and school.	Consider vitamin D supplementation for children who are veiled or dark skinned. [2]	Supplement with 400 IU/d (eg. multivitamin) to prevent deficiency.[2]	Non-routine dietary patterns.	Mixed messages at schools and childcare centres. Overzealous sun protection. Difficulties with different recommendations dependent on skin colour.

Summary of Vitamin D Recommendations

Group	Sunlight Exposure Advice	Supplementation Advice	Recommended Dose	Food Considerations	Other Considerations
Adults					
General Population	Adhere to the Cancer Council of Australia guidelines.[1]	Not necessary to supplement all adults. Supplementation necessary if deficient (see below for recommendations).	N/A	Consideration of fortification of food supply-mandatory or voluntary. Possible risks associated with high intakes of vitamin D (brain lesions, vascular calcification). Inconclusive results from a study in Finland linking an improvement in vitamin D levels with food fortification.	No population-based data regarding vitamin D status of the general population in Australia and it relationship to health and related outcomes. Different effects with various ethnic groups and individual response make it difficult to make recommendations.
High Risk Population *Disability (physical and mental), dark skinned, veiled or modestly dressed, limited sun exposure.*	Cancer Council of Australia recommends 'more UV radiation exposure' needed. Not quantified.[1]	Screening for vitamin D deficiency important. Prescribe appropriate supplements to maintain adequate serum 25(OH)D levels.	Probably need doses of 2000 IU/d to raise serum 25(OHD) levels to greater than 75nmol/L [4] Higher intakes over 80ug/d safe (3000-5000 IU/d for 6-12 weeks can be used to replete body stores).[4]	Difficult to obtain adequate intakes of vitamin D from the diet alone.	Long term compliance with supplements is generally poor. Larger doses of vitamin D intermittently may assist.

Summary of Vitamin D Recommendations

Group	Sunlight Exposure Advice	Supplementation Advice	Recommended Dose	Food Considerations	Other Considerations
Older Adults and the Elderly					
General Population	Adhere to the Cancer Council of Australia guidelines.[1]	No evidence to support routine supplementation for all older adults. Supplementation necessary if deficient (recommendations below).	A daily intake of 10-15 ug (400-600 IU) recommended to prevent deficiency.[4]	Consideration of fortification of food supply-mandatory or voluntary.	-
High Risk Population *Residential care, housebound, disability*	Adhere to the Cancer Council of Australia guidelines.[1]	Screening for vitamin D deficiency important. Supplement all high risk individuals, except those with hypercalcemia and other contraindications. Need to obtain baseline serum 25(OH)D levels to guide appropriate intervention; that is use of proprietary supplementation or high dose formulated vitamin D_3. Evidence of widespread monitoring of vitamin D will give impetus to a systems approach and support policy development. Need a greater understanding and co-operation from all health and medical professionals.	Minimum 1000 IU/d (assume deficiency based on previous studies); 2000 IU/d required to meet 75nmol/L or larger doses (3000-5000 IU/d) sufficient for 3-4 months to raise 25(OHD) to 75nmol/L to overcome poor compliance with supplementation.[4] Large single doses found to be effective, cheaper with higher adherence; 50,000IU in tablet form or 600,000IU intramuscularly in a single dose.[4] A precedent has been established for safe use of 100,000 IU given orally for 3 monthly in persons with mild, moderate or severe Vitamin D deficiency.[6]	Low food intake: difficult to obtain sufficient vitamin D even if food fortified.	Screening for deficiency should take place in residential care sites and appropriate supplementation should be prescribed. Vitamin D supplementation and calcium intake equal to the RDI for adults >70 yrs should be considered together to maximise benefits. Aim to achieve a serum 25(OH)D level of >75nmol/L to reduce falls & fracture risk. Consider mobility and mental state of resident to determine potential for sun exposure, as an adjunct to supplementation. Dose needs to be administered in a liquid or fruit puree medium to be suitable for residents with dysphagia. An inexpensive systematic approach to vitamin D supplementation can be delivered through high dose therapy on a three monthly basis, with minimal impact on workload and routines. However, it is difficult to source high dose vitamin D supplements in Australia, other than for research purposes. The cost of daily vitamin D supplementation is borne by individual residents. Larger doses are relatively cheap when administered more routinely where cost can be covered by the institution.

Key Findings / Issues for the Australian Population

- Lack of ongoing monitoring of rates of deficiency/insufficiency in infants, children, adolescents, ethnic, cultural groups, and the general community dwelling population.
- No information in lifestyle and genetic predictors of vitamin D status.
- No information on the adverse health affects of poor/variable vitamin D status.
- Lack of readily available higher dose supplements to treat deficiency in high risk groups, where compliance with daily supplementation is typically poor.
- Lack of understanding about the importance of inadequate vitamin D status leading to a widespread lack of implementation of policy guidelines to treat deficiency.

General Issues

- Laboratory assays give variable results: use larger established laboratories to ensure accuracy. Some laboratories provide no figures for serum 25(OH)D if less than 20nmol/L. This is not acceptable.
- Major barrier to implementation of policy to supplement vitamin D insufficient/deficient populations, lack of cooperation by medical, nursing, health workers, administrative staff and patients and family with deficiency.

'New' Dietary Recommendations for Vitamin D – Adequate Intakes [5]

		Adequate Intake	Upper Level of Intake *
Infants	0-6 months	5 µg/d	25 µg/d
	7-12 months	5 µg/d	25 µg/d
Children and Adolescents			
All	1-3 years	5 µg/d	80 µg/d
	4-8 years	5 µg/d	80 µg/d
Boys	9-13 years	5 µg/d	80 µg/d
	14-18 years	5 µg/d	80 µg/d
Girls	9-13 years	5 µg/d	80 µg/d
	14-18 years	5 µg/d	80 µg/d
Adults			
Men	19-30 yrs	5 µg/d	80 µg/d
	31-50 yrs	5 µg/d	80 µg/d
	51-70 yrs	10 µg/d	80 µg/d
	>70 yrs	15 µg/d	80 µg/d
Women	19-30 yrs	5 µg/d	80 µg/d
	31-50 yrs	5 µg/d	80 µg/d
	51-70 yrs	10 µg/d	80 µg/d
	>70 yrs	15 µg/d	80 µg/d
Pregnancy	14-18 yrs	5 µg/d	80 µg/d
	19-30 yrs	5 µg/d	80 µg/d
	31-50 yrs	5 µg/d	80 µg/d
Lactation	14-18 yrs	5 µg/d	80 µg/d
	19-30 yrs	5 µg/d	80 µg/d
	31-50 yrs	5 µg/d	80 µg/d

* Upper level = highest average daily nutrient intake level likely to pose no adverse health effects to almost all individuals in the general population.

References

1. Risks and Benefits of Sun Exposure – Position Statement. http://www.cancer.org.au/documents/RisksBenefitsSunExposure03May07.pdf

2. Munns C, Zacharin MR, Rodda CP et al. Prevention and treatment of infant and childhood vitamin D deficiency in Australia and New Zealand: A consensus statement. Med J Aust 2006;185:268-72.

3. Sun Protection and Infants (0-12 months) – Position Statement. http://www.cancer.org.au/documents/Sun_protection_infants_May_2005.pdf.

4. Vitamin D and adult bone health in Australia and New Zealand: A position statement. Med J Aust 2005;182:281-5.

5. National Health and Medical Research Council. Nutrient Reference Values for Australia and New Zealand Including Recommended Dietary Intakes. Canberra: Commonwealth of Australia and New Zealand Government, 2006.

6. Wigg A, Prest C, Slobodian P, Need A, Cleland L. A system for improving vitamin D nutrition in residential care. Med J Aust 2006;185:195-198.