



# vitamin angels

## GUIDELINES FOR USE OF VITAMIN A SUPPLEMENTS IN UNIVERSAL DISTRIBUTION PROGRAMS FOR PREVENTION OF VITAMIN A DEFICIENCY

### CONTEXT

Vitamin A deficiency (VAD) is a major contributor to mortality among children under five<sup>1</sup>, and underlies a significant burden of illness experienced by populations. An estimated 127 million children under 5 worldwide are VAD, most of which is concentrated in South Asia and sub-Saharan Africa.<sup>2</sup>

VAD occurs when an individual's diet contains insufficient vitamin A to meet needs associated with growth and development and physiological functions. Women of reproductive age are at risk of VAD and its consequences because of additional vitamin A requirements during pregnancy and lactation. Newborns can be vitamin A depleted due to poor vitamin A status among lactating women resulting in insufficient transfer of vitamin A during breastfeeding; and as breastfeeding subsides 4 - 6 months after birth, infants are more likely to become VAD. Finally, infections such as measles, diarrhea and acute respiratory tract infections in infants and children can precipitate VAD, and VAD can pre-dispose infants and children to infection. This complex relationship occurs because vitamin A is critical during infant and child growth to ensure structural integrity of cells essential for maintaining a "barrier" to infection which guards against external infection.<sup>3</sup> Proper vitamin A status in infants/children reduces the risk of mortality from measles, diarrhea, and overall mortality by 50%, 33% and 25%, respectively.<sup>4</sup>

Vitamin A is also essential for vision/ocular function. The most visible indicator of VAD is xerophthalmia, a disorder of the eye that can lead to night blindness, corneal destruction and permanent blindness in children.<sup>5</sup> Yet, many more children do not show signs of VAD, and have poor vitamin A status placing them at risk of reduced ability to fend off infectious diseases that lead to excess mortality and morbidity.

### INDICATIONS FOR USE

Universal distribution of Vitamin A supplements (i.e., distribution to all infants and children to 60 months of age and all lactating women) is effective way to prevent VAD among infants, children and women; Universal distribution is recommended in all countries identified by WHO/UNICEF as priority countries for vitamin A supplementation<sup>6</sup>. Targeted distribution of vitamin A supplements is also an effective way to prevent VAD among high-risk groups and is recommended by WHO/UNICEF. Finally – although beyond the scope of this document – vitamin A supplementation is recommended for treatment of xerophthalmia.

### DOSAGE, ADMINISTRATION AND FREQUENCY

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<sup>1</sup> *The World Health Report 2002: reducing risks, promoting health life*. WHO, 2002.

<sup>2</sup> *Vitamin A Supplementation: A Decade of Progress*. UNICEF, 2007.

<sup>3</sup> F.S.W. McCollough, C.A. Northrop-Clewes, and D.I. Thurnham. "The effect of vitamin A on epithelial integrity," *Proceedings of the Nutrition Society* (1999), 58, 289–293.

<sup>4</sup> GH Beaton, R. Martorell, KA Aronson et al. "Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries." Toronto, Canada: University of Toronto, 1993.

<sup>5</sup> *Ibid.*

<sup>6</sup> High priority countries are generally defined as having: i) child mortality equal or greater than 70 deaths/1000 live births – currently 62 countries, ii) child mortality less than 70 deaths/1000 live births but showing evidence of VAD derived from national assessments – currently 32 countries, or iii) 9 other countries with a history of programming where the national government recognizes VAD as a problem and has a demonstrated commitment to programming to redress VAD. See UNICEF 2009: [http://www.childinfo.org/vitamina\\_priority.html](http://www.childinfo.org/vitamina_priority.html)

The World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) recommend the following schedule for vitamin A supplementation in universal distribution programs <sup>7</sup>:

TABLE 1. VITAMIN A SUPPLEMENTATION SCHEDULE IN UNIVERSAL DISTRIBUTION PROGRAMS TO PREVENT VAD

Target Group	Dose	How Often
Infants < 6 months of age:		
• Children not breast-fed	50,000 IU, administered orally	Once
• Breast-fed infants whose mothers have not received a vitamin A supplement	50,000 IU, administered orally	Once
Infants 6-11 months of age	100,000 IU, administered orally	Every 6 months
Children > 12 months of age	200,000 IU, administered orally	Every 6 months
Mothers (post-partum, lactating)	200,000 IU, administered orally	Once, within 8 weeks of delivery

#### PRECAUTIONS TO BE OBSERVED IN UNIVERSAL DISTRIBUTION PROGRAMS

- Keep vitamin A out of the reach of children,
- Keep containers containing vitamin A tightly closed, and
- Store containers with vitamin A in a cool, dark, dry place; and out of direct sunlight

#### CONTRAINDICATIONS

Certain formulations of vitamin A supplements should NEVER be given to pregnant women, including:

- Any formulation of vitamin A noted in Table 1 above,
- **Any formulation intended for daily use** that is greater than 10,000 international units – unless, as recommended by WHO, there are severe signs of active xerophthalmia (i.e., acute corneal lesions) are present, and
- **Any formulation intended for weekly use** that is greater than 25,000 international units – unless, as recommended by WHO, there are severe signs of active xerophthalmia (i.e., acute corneal lesions) are present.

#### CONSIDERATIONS FOR LARGE SCALE VITAMIN A DISTRIBUTION PROGRAMS

- *Approaches for ensuring appropriate vitamin A status.* Ensuring that a population achieves and maintains nutritional intake of vitamin A requires comprehensive, long-term measures that can include nutritional education; vitamin A fortification of condiments and foods consumed by the target population (e.g., such as sugar, wheat flour, oil); and promotion of a diet containing foods rich in vitamin A (e.g., eggs, fish liver oil, red palm oil, green leafy vegetables, and dark-orange fruits and vegetables). Vitamin A supplements can be used to prevent VAD in priority countries where target populations are known to be at ongoing risk of VAD. Priority countries, in general, include those affected by periodic drought, chronic poverty, and food shortages and vitamin A supplementation programs will need to be in place for many years.

<sup>7</sup> *Vitamin A Supplements – A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia, second edition.* Prepared by a WHO/UNICEF/IVACG Task Force. WHO, 1997.

- *Universal Distribution:* Distribution of vitamin A supplements for prevention of VAD in priority countries should be universal, meaning as feasible, distribution of vitamin A supplements should be to all pre-school children to age 5 (with priority given to the age group 6 months to 3 years); and, to all mothers within 8 weeks after delivery.
- *Timing of Universal Distribution:* Universal distribution schemes should attempt to make vitamin A supplements available before seasons of special risk. For example, in advance of the season when diarrhea or measles is most common or when foods rich in vitamin A are scarce.
- *Importance of Breast-feeding.* Protection, promotion, and support of breast-feeding should be an integral part of any strategy to combat VAD. Breast-feeding helps ensure an adequate intake of vitamin A by infants and young children. Mothers whose vitamin A status is adequate – either as a result of dietary intake or supplementation – produce breast milk with a vitamin A concentration that meets their infants’ needs for at least the first 6 months of life.
- *Overall safety and efficacy of vitamin A distribution in universal or targeted distribution programs.* Vitamin A supplementation programs are known to be safe and effective. When vitamin A is administered in recommended doses, there are no serious or permanent adverse effects; such side-effects as may occasionally occur (e.g., for infant, a tense or bulging fontanelle or vomiting) are minor and transitory and do not require specific treatment. As adequate vitamin A status is achieved through other means (e.g., improved diet or availability of fortified foods), supplementation becomes less necessary, although its continuation is not harmful. Moreover, continued targeted supplementation may be required to ensure adequate vitamin A status among groups with persistent deficiency <sup>8</sup>.
- *Targeted distribution of vitamin A for high-risk populations.* Infants and children with severe protein-energy malnutrition or infections (eg., measles, diarrhea, respiratory tract infection, and chicken-pox) are considered to be at increased or high-risk of VAD; and vitamin A supplementation through targeted programs for these groups can prevent VAD. It is important to recognize that because evidence suggests VAD occurs in clusters, siblings and children living in the same household or community as children with xerophthalmia or other childhood infections (eg., measles, diarrhea, respiratory disease, or chickenpox) are also considered at increased or high-risk of VAD; consequently, all children in these households and their community should be afforded vitamin A supplementation through a targeted distribution program. The schedule for distribution of vitamin A supplements for children at high-risk through targeted programs as recommended by WHO is shown below in Table 2.

TABLE 2. VITAMIN A SUPPLEMENTATION SCHEDULE IN TARGETED DISTRIBUTION PROGRAMS FOR CHILDREN AT HIGH RISK FOR VAD <sup>9</sup>

Target Group	Dose	How Often
Infants < 6 months of age:	50,000 IU, administered orally	Once
Infants 6-11 months of age	100,000 IU, administered orally	Once
Children > 12 months of age	200,000 IU, administered orally	Once

*Note: children at high risk for VAD should be treated immediately and then included in a universal distribution program in 6 months.*

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

- *Treatment of infants and children with signs of xerophthalmia.* It is beyond the scope of this document to explain all the actions needed for treatment of xerophthalmia; however, *initial* treatment for infants and children with any stage of active xerophthalmia receive the same supplementation with vitamin A as the schedule shown above (i.e., Table 2) for the supplementation of children at high risk for VAD. The first dose should be administered immediately upon diagnosis; individuals with acute corneal lesions should be referred to a hospital on emergency basis as they present complex treatment problems and require additional treatment. The full schedule of vitamin A supplementation for treatment of infants and children of any age with signs of xerophthalmia as recommended by the WHO <sup>10</sup> is shown in Table 3, below.

TABLE 3. VITAMIN A SUPPLEMENTATION SCHEDULE FOR TREATMENT OF XEROPHTHALMIA IN INFANTS AND CHILDREN ALL AGES

Target Group	Dose	How Often
Immediately upon diagnosis:		
• Infants < 6 months of age:	50,000 IU, administered orally	Once
• Infants 6-11 months of age	100,000 IU, administered orally	Once
• Children > 12 months of age	200,000 IU, administered orally	Once
Next Day:		
• As above	Same age-specific doses as above	Once
At least two weeks later:		
• As above	Same age-specific doses as above	Once

*Note: “next day” dosing and subsequent doses can be administered by the child’s mother; and WHO also recommends that all children with measles be treated with the same schedule of vitamin A supplementation as for xerophthalmia.*

- *Women of reproductive age.* According to WHO, women of reproductive age with night blindness or Bitot’s spots should be treated with a daily dose of 5,000 - 10,000 International Units of vitamin A for at least 4 weeks. Such a daily dose should never exceed 10,000 International Units, although a weekly dose not exceeding 25,000 International Units may be substituted. When severe signs of active xerophthalmia (i.e., acute corneal lesions) occur in women of reproductive age, WHO recommends, whether the women is pregnant or not, it is necessary to balance the possible teratogenic effect or other risks of a high dose of vitamin A to the fetus (should she be pregnant) against the serious consequences (for her and the fetus) of VAD. In these circumstances, the high dose treatment for corneal xerophthalmia as described in table 3 can be administered <sup>11</sup>.
- *Very high-risk populations.* Refugees and others populations cut off from their usual food sources or afflicted by famine constitute very high-risk groups in special need of periodic supplementation. Follow the dosing schedule for children at “high-risk” in Table 2.
- *Calculating the amount of vitamin A needed in a universal distribution program in countries identified as high priority by WHO. For every 1000 population, assume that:*
  - 1.5% are infants under 6 months of age 15
  - 1.5% are infants 6 months to 1 year of age 15

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

- 5% are children 1-3 years of age 50
- 10% are children 3-5 years of age 90
- 3% are lactating women 30

Approximate annual procurement for every 1000 persons population translates into:

50,000 IU capsules = 15 capsules per year

- $15 \times 1 = 15$

100,000 IU capsules = 15 capsules/year

- $15 \times 1 = 15$

200,000 IU capsules = 370 capsules/year

- $50 \times 2 = 100$
- $(90 + 30) \times 2 = 240$
- $30 \times 1 = 30$

**Note:** for programs where distribution includes treatment for Bitot's spots and active xerophthalmia, the following references are handy as a guide for additional calculation of need per 1000 population:

- 25% or 250 are women of reproductive age (and 4% of these will have Bitot's spots) 10
- 5% of children 1-5 years of age have one episode of xerophthalmia per year 7