

## HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use M.V.I. Pediatric® safely and effectively. See full prescribing information for M.V.I. Pediatric.

**M.V.I. Pediatric (multiple vitamins for injection), for intravenous use**  
**Initial U.S. Approval: 1983**

### RECENT MAJOR CHANGES

Dosage And Administration, Dosage Information (2.2) 2/2019

### INDICATIONS AND USAGE

M.V.I. Pediatric is a combination of vitamins indicated for the prevention of vitamin deficiency in pediatric patients up to 11 years of age receiving parenteral nutrition (1)

### DOSAGE AND ADMINISTRATION

- M.V.I. Pediatric is a combination product that contains the following vitamins: ascorbic acid, vitamin A, vitamin D, thiamine, riboflavin, pyridoxine, niacinamide, dexpantenol, vitamin E, vitamin K, folic acid, biotin, and vitamin B<sub>12</sub> (2.1)
- Supplied as a single-dose vial of lyophilized powder for reconstitution intended for administration by intravenous infusion after dilution. (2.1)
- Recommended daily dosage is based on patient's actual weight (2.2)
  - Less than 1 kg: The daily dose is 1.5 mL
  - 1 kg to 3 kg: The daily dose is 3.25 mL
  - 3 kg or more: The daily dose is 5 mL
- One daily dose of the reconstituted solution (1.5 mL, 3.25 mL or 5 mL) is then added directly to the intravenous fluid (2.2,2.3)
- See Full Prescribing Information for reconstitution instructions (2.3)
- Monitor blood vitamin concentrations (2.4)
- See Full Prescribing Information for drug incompatibilities (2.5)

### DOSAGE FORMS AND STRENGTHS

M.V.I. Pediatric for injection is available as a single-dose vial for reconstitution. (3) See Full Prescribing Information for vitamin content (11)

### CONTRAINDICATIONS

- Hypersensitivity to any of the vitamins or excipients (4)
- Existing hypervitaminosis (4)

### WARNINGS AND PRECAUTIONS

- Risk of Aluminum Toxicity:** Aluminum may reach toxic levels with prolonged administration. Monitor aluminum levels in at risk patients (5.1)
- Allergic Reactions:** to thiamine may occur (5.2)
- Hypervitaminosis A:** Patients with renal failure or liver disease may be at higher risk (5.3)
- Decreased Anticoagulant Effect of Warfarin:** Periodically monitor prothrombin time (5.4)

- Interferes with Megaloblastic Anemia Diagnosis:** Avoid use during testing for this disorder (5.5)
- Risk of Vitamin Deficiencies or Excesses:** Monitor blood vitamin concentrations (5.6)
- False Negative Urine Glucose Tests:** May occur due to vitamin C (5.7)
- Risk of Vitamin E Toxicity:** Additional oral and parenteral vitamin E may result in elevated vitamin E blood concentrations in infants (5.8)
- Low Vitamin A Levels:** Monitor vitamin A levels (5.9)
- Risk of E-Ferol Syndrome:** due to polysorbates (5.10)

### ADVERSE REACTIONS

Adverse reactions have included anaphylaxis, rash, erythema, pruritus, headache, dizziness, agitation, anxiety, diplopia, urticaria, shortness of breath, wheezing and angioedema (6)

To report SUSPECTED ADVERSE REACTIONS, contact Hospira, Inc. at 1-800-441-4100 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).

### DRUG INTERACTIONS

#### Drug Interactions Affecting Co-administered Drugs:

- Antibiotics:** Thiamine, riboflavin, pyridoxine, niacinamide and ascorbic acid decrease activities of erythromycin, kanamycin, streptomycin, doxycycline and lincomycin (7.1)
  - Bleomycin:** Ascorbic acid and riboflavin may reduce the activity of bleomycin (7.1)
  - Levodopa:** Pyridoxine may decrease blood levels of levodopa and levodopa efficacy may decrease (7.1)
  - Phenytoin:** Folic acid may decrease phenytoin blood levels and increase risk of seizure (7.1)
  - Methotrexate:** Folic acid may decrease response to methotrexate (7.1)
- #### Drug Interactions Affecting Vitamin Levels:
- Hydralazine, Isoniazid:** Concomitant administration of hydralazine or isoniazid may increase pyridoxine requirements (7.2)
  - Phenytoin:** May decrease folic acid concentrations (7.2)

### USE IN SPECIFIC POPULATIONS

- Renal Impairment:** Monitor renal function, calcium, phosphorus and vitamin A levels (8.6)
- Hepatic Impairment:** Monitor vitamin A levels (8.7)

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Revised: 2/2019

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## FULL PRESCRIBING INFORMATION

### 1 INDICATIONS AND USAGE

M.V.I. Pediatric is a combination of vitamins indicated for the prevention of vitamin deficiency in pediatric patients up to 11 years of age receiving parenteral nutrition.

The physician should not await the development of clinical signs of vitamin deficiency before initiating vitamin therapy.

### 2 DOSAGE AND ADMINISTRATION

#### 2.1 Important Dosage and Administration Instructions

M.V.I. Pediatric is a combination product that contains the following vitamins: ascorbic acid, vitamin A, vitamin D, thiamine, riboflavin, pyridoxine, niacinamide, dexpanthenol, vitamin E, vitamin K, folic acid, biotin, and vitamin B12 [*see Dosage and Administration (2.2)*].

M.V.I. Pediatric is supplied as a single-dose vial of lyophilized powder for reconstitution and intended for administration by intravenous infusion after dilution.

Do not administer M.V.I. Pediatric as a direct, undiluted intravenous injection as it may cause dizziness, faintness and tissue irritation.

#### 2.2 Dosage Information

- The recommended daily dosage volume of 1.5 mL, 3.25 mL, or 5 mL of the reconstituted solution is based on the patient's actual weight of less than 1 kg, 1 kg to less than 3 kg, and more than or equal to 3 kg, respectively (see Table 1).

**Table 1 – Recommended Weight-Based Dosage of M.V.I. Pediatric**

	Less than 1 kg	1 kg to less than 3 kg	More than or equal to 3 kg
Daily Dosage Volume	1.5 mL	3.25 mL	5 mL
Vitamin A <sup>a</sup> (retinol)	690 IU <sup>d</sup> (equals approx. 0.207 mg)	1,495 IU (equals approx. 0.449 mg)	2,300 IU (equals approx. 0.690 mg)
Vitamin D <sup>b</sup> (ergocalciferol)	120 IU (equals 3 mcg)	280 IU (equals 7 mcg)	400 IU (equals 10 mcg)
Vitamin E <sup>c</sup> ( <i>dl</i> -alpha-tocopheryl acetate)	2.1 IU (equals 2 mg)	4.6 IU (equals 5 mg)	7 IU (equals 7 mg)
Vitamin K <sub>1</sub> (phytonadione)	0.1 mg	0.1 mg	0.2 mg
Vitamin B <sub>2</sub> (as riboflavin 5-phosphate sodium)	0.4 mg	0.9 mg	1.4 mg
Vitamin C (ascorbic acid)	24 mg	52 mg	80 mg
Vitamin B <sub>6</sub> (pyridoxine hydrochloride)	0.3 mg	0.7 mg	1 mg
Niacinamide	5.1 mg	11.1 mg	17 mg
Dexpanthenol (as <i>d</i> -pantothenyl alcohol)	1.5 mg	3.3 mg	5 mg
Vitamin B <sub>1</sub> (thiamine hydrochloride)	0.4 mg	0.8 mg	1.2 mg
Biotin	6 mcg	13 mcg	20 mcg
Folic acid	42 mcg	91 mcg	140 mcg
Vitamin B <sub>12</sub> (cyanocobalamin)	0.3 mcg	0.7 mcg	1 mcg

(a) 0.1 mg vitamin A equals 333.3 USP units = 333.3 IU.

(b) 1 mcg ergocalciferol equals 40 USP units = 40 IU.

(c) 1 mg vitamin E equals 1 USP units = 1 IU.

(d) IU = international units.

- One daily dose of the reconstituted solution (1.5 mL, 3.25 mL or 5 mL) is then added directly to the intravenous fluid [*see Dosage and Administration (2.3)*].
- Patients with multiple vitamin deficiencies or with increased vitamin requirements may need multiple daily dosages as indicated or additional doses of individual vitamins. However, additional daily dosages in infants are not recommended [*see Warnings and Precautions (5.8)*]. Supplemental vitamin A may be required for low-birth weight infants.

### 2.3 Preparation and Administration Instructions

- M.V.I Pediatric is to be reconstituted and diluted only in a suitable work area such as a laminar flow hood (or an equivalent clean air compounding area).
- Reconstitute the single-dose vial of M.V.I. Pediatric by adding 5 mL of Sterile Water for Injection USP, or Dextrose Injection USP 5%, or Sodium Chloride Injection USP to the 10 mL vial.
- Swirl the vial gently after the addition of the diluent to hasten reconstitution. The reconstituted solution is ready within three minutes for use.
- Visually inspect for particulate matter and discoloration prior to administration.
- Once reconstituted, immediately withdraw the dose to be added to the appropriate intravenous fluids [*see Dosage Information (2.2)*] and discard any unused portion. After reconstitution, complete withdrawal of vial contents within 4 hours. The reconstituted solution may be refrigerated and stored for up to 4 hours.

- After M.V.I. Pediatric is diluted in an intravenous infusion, refrigerate the resulting solution unless it is to be used immediately, and use the solution within 24 hours after dilution.
- Minimize exposure to light because some of the vitamins in M.V.I. Pediatric, particularly A, D and riboflavin, are light sensitive.

## **2.4 Monitoring Vitamin Blood Levels**

Monitor blood vitamin concentrations to ensure maintenance of adequate levels, particularly in patients receiving parenteral multivitamins as the only source of vitamins for long periods of time.

## **2.5 Drug Incompatibilities**

- M.V.I. Pediatric is not physically compatible with alkaline solutions such as a sodium bicarbonate solution and other alkaline drugs such as acetazolamide sodium, aminophylline, ampicillin sodium, tetracycline HCl and chlorothiazide sodium.
- Folic acid is unstable in the presence of calcium salts such as calcium gluconate.
- Vitamin A and thiamine in M.V.I. Pediatric may react with bisulfite solutions such as sodium bisulfite or vitamin K bisulfite.
- Do not add M.V.I. Pediatric directly to intravenous fat emulsions.
- Consult appropriate references for listings of physical and chemical compatibility of solutions and drugs with M.V.I. Pediatric. In such circumstances, admixture or Y-site administration with M.V.I. Pediatric should be avoided.

## **3 DOSAGE FORMS AND STRENGTHS**

M.V.I. Pediatric for injection is available as a single-dose vial of yellow to amber colored lyophilized powder for reconstitution.

See Description section for vitamin strengths [*see Description (11)*].

## **4 CONTRAINDICATIONS**

M.V.I. Pediatric is contraindicated in patients who have:

- A history of known hypersensitivity to any of the vitamins or excipients in M.V.I. Pediatric [*see Warnings and Precautions (5.2), Adverse Reactions (6)*]
- An existing hypervitaminosis

## **5 WARNINGS AND PRECAUTIONS**

### **5.1 Aluminum Toxicity**

M.V.I. Pediatric contains aluminum, up to 42 mcg/L that may be toxic. Aluminum may reach toxic levels with prolonged parenteral administration in patients with renal impairment. Premature neonates are particularly at risk because their kidneys are immature, and they require large amounts of calcium and phosphate solutions, which contain aluminum.

Patients with impaired kidney function, including premature neonates, who receive parenteral levels of aluminum at greater than 4 to 5 micrograms per kg per day, accumulate aluminum at levels associated with central nervous system and bone toxicity. Tissue loading may occur at even lower rates of administration. To

prevent aluminum toxicity, periodically monitor aluminum levels with prolonged parenteral administration of M.V.I. Pediatric.

## **5.2 Allergic Reactions to Thiamine**

Allergic reactions such as urticaria, shortness of breath, wheezing and angioedema have been reported following intravenous administration of thiamine, an ingredient in M.V.I. Pediatric. There have been rare reports of anaphylaxis following intravenous doses of thiamine. No fatal anaphylaxis reactions associated with M.V.I. Pediatric have been reported.

## **5.3 Hypervitaminosis A**

Hypervitaminosis A, manifested by nausea, vomiting, headache, dizziness, and blurred vision, has been reported in patients with renal failure receiving 1.5 mg per day retinol and in patients with liver disease. Therefore, supplementation of patients with renal failure and patients with liver diseases with vitamin A, an ingredient found in M.V.I. Pediatric, should be undertaken with caution [*see Use in Specific Populations (8.6, 8.7)*]. Blood levels of Vitamin A should be monitored periodically.

## **5.4 Decreased Anticoagulant Effect of Warfarin**

M.V.I. Pediatric contains Vitamin K, which may decrease the anticoagulant effect of warfarin. In patients who are on warfarin anticoagulant therapy receiving M.V.I. Pediatric, prothrombin time/INR should be periodically monitored to determine if the dose of warfarin needs to be adjusted.

## **5.5 Interference with Diagnosis of Megaloblastic Anemia**

M.V.I. Pediatric contains folic acid and cyanocobalamin, which can mask serum deficits of folic acid and cyanocobalamin in patients with megaloblastic anemia. Avoid the use of M.V.I. Pediatric in patients with suspected or diagnosed megaloblastic anemia prior to blood sampling for the detection of the folic acid and cyanocobalamin deficiencies.

## **5.6 Potential to Develop Vitamin Deficiencies or Excesses**

In patients receiving parenteral multivitamins, such as with M.V.I. Pediatric, blood vitamin concentrations should be periodically monitored to determine if vitamin deficiencies or excesses are developing. M.V.I. Pediatric may not correct long-standing specific vitamin deficiencies. The administration of additional doses of specific vitamins may be required [*see Dosage and Administration (2.2)*].

## **5.7 Interference with Urine Glucose Testing**

M.V.I. Pediatric contains Vitamin C, which is also known as ascorbic acid. Ascorbic acid in the urine may cause false negative urine glucose determinations.

## **5.8 Vitamin E Overdose in Infants Receiving Additional Vitamin E**

Additional vitamin E supplementation of patients receiving M.V.I. Pediatric may result in elevated blood concentrations of vitamin E and potential vitamin E toxicity in infants. Avoid additional oral or parenteral doses of vitamin E in infants. A daily dose of M.V.I. Pediatric contains adequate concentrations of vitamin E required to achieve normal blood levels of vitamin E.

## 5.9 Risk of Low Vitamin A Levels

Vitamin A may adhere to plastic, resulting in lower vitamin A concentrations after administration of M.V.I. Pediatric. Therefore, blood vitamin A concentrations should be periodically monitored and the administration of additional therapeutic doses of Vitamin A may be required, especially in low birth weight infants.

## 5.10 Risk of E-Ferol syndrome

E-Ferol syndrome, manifested by thrombocytopenia, renal dysfunction, hepatomegaly, cholestasis, ascites, hypotension and metabolic acidosis, has been reported in low-birth weight infants following administration of polysorbates, which are found in M.V.I. Pediatric. No E-Ferol syndrome associated with M.V.I. Pediatric has been reported.

## 6 ADVERSE REACTIONS

The following adverse reactions are discussed in greater detail in other sections of the label.

- Allergic Reactions to Thiamine [*see Warnings and Precautions (5.2)*].
- Hypervitaminosis A [*see Warnings and Precautions (5.3)*].

The following adverse reactions have been identified during post approval use of M.V.I. Pediatric. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

*Allergic:* anaphylaxis, urticaria, shortness of breath, wheezing, angioedema

*CNS:* headache, dizziness, agitation, anxiety

*Dermatologic:* rash, erythema, pruritus

*Ophthalmic:* diplopia

## 7 DRUG INTERACTIONS

### 7.1 Effect of M.V.I. Pediatric on Other Drugs

Warfarin: Vitamin K, a component of M.V.I. Pediatric, antagonizes the anticoagulant action of warfarin. In patients who are co-administered warfarin and M.V.I. Pediatric, monitor blood levels of prothrombin/INR periodically to determine if the dose of warfarin needs to be adjusted.

Phenytoin: Folic acid may increase phenytoin metabolism and lower the serum concentration of phenytoin, resulting in increased seizure frequency.

Methotrexate: Folic acid may decrease a patient's response to methotrexate therapy.

Levodopa: Pyridoxine may increase the metabolism of levodopa (decrease blood level of levodopa) and decrease its efficacy.

Antibiotics: Thiamine, riboflavin, pyridoxine, niacinamide, and ascorbic acid decrease antibiotic activities of erythromycin, kanamycin, streptomycin, doxycycline, and lincomycin.

Bleomycin: Ascorbic acid and riboflavin inactivate bleomycin *in vitro*, thus the activity of bleomycin may be reduced.

### 7.2 Effect of Other Drugs on M.V.I. Pediatric

Hydralazine or Isoniazid: Concomitant administration of hydralazine or isoniazid may increase pyridoxine requirements.

Chloramphenicol: In patients with pernicious anemia, the hematologic response to vitamin B12 therapy may be inhibited by concomitant administration of chloramphenicol.

Phenytoin: Phenytoin may decrease serum folic acid concentrations.

## 8 USE IN SPECIFIC POPULATIONS

### 8.4 Pediatric Use

The safety and effectiveness of M.V.I. Pediatric for the prevention of vitamin deficiency have been established in pediatric patients up to 11 years of age receiving parenteral nutrition. The safety and effectiveness of M.V.I. Pediatric have not been established in pediatric patients older than 11 years of age.

M.V.I. Pediatric contains aluminum that may be toxic for premature neonates. Aluminum levels should be monitored periodically during administration of M.V.I. Pediatric to premature neonates [see *Warnings and Precautions (5.1)*].

Additional vitamin E supplementation of infants receiving M.V.I. Pediatric may result in elevated blood concentrations of vitamin E and potential vitamin E toxicity [see *Warnings and Precautions (5.8)*].

E-Ferol syndrome has been reported in low-birth weight infants following administration of polysorbates, which are found in M.V.I. Pediatric [see *Warnings and Precautions (5.10)*].

### 8.6 Renal Impairment

M.V.I. Pediatric has not been studied in patients with renal impairment. Monitor renal function, calcium, phosphorus and vitamin A levels in patients with renal impairment [see *Warnings and Precautions (5.1, 5.3)*].

### 8.7 Hepatic Impairment

M.V.I. Pediatric has not been studied in patients with hepatic impairment. Monitor vitamin A level in patients with liver disease [see *Warnings and Precautions (5.3)*].

## 10 OVERDOSAGE

Signs and symptoms of acute or chronic overdosage may be those of individual M.V.I. Pediatric component toxicity.

## 11 DESCRIPTION

M.V.I. Pediatric (multiple vitamins for injection) is a yellow to amber colored lyophilized, sterile powder for reconstitution intended for administration by intravenous infusion after dilution [see *Dosage and Administration (2.3)*].

Table 2 provides the strengths of the vitamins provided in each 5 mL of reconstituted product:



**Table 2: M.V.I. PEDIATRIC FORMULATION**

Ingredient	Amount per Unit Dose
<b>Fat Soluble Vitamins*</b>	
Vitamin A <sup>a*</sup> (retinol)	2,300 IU <sup>d</sup> (equals 0.7 mg)
Vitamin D <sup>b*</sup> (ergocalciferol)	400 IU (equals 10 mcg)
Vitamin E <sup>c*</sup> ( <i>dl</i> -alpha-tocopheryl acetate)	7 IU (equals 7 mg)
Vitamin K <sub>1</sub> <sup>*</sup> (phytonadione)	200 mcg
<b>Water Soluble Vitamins</b>	
Vitamin B <sub>2</sub> (as riboflavin 5-phosphate sodium)	1.4 mg
Vitamin C (ascorbic acid)	80 mg
Vitamin B <sub>6</sub> (pyridoxine hydrochloride)	1 mg
Niacinamide	17 mg
Dexpanthenol (as <i>d</i> -pantothenyl alcohol)	5 mg
Vitamin B <sub>1</sub> (thiamine hydrochloride)	1.2 mg
Biotin	20 mcg
Folic acid	140 mcg
Vitamin B <sub>12</sub> (cyanocobalamin)	1 mcg

\* Fat-soluble vitamins A, D, E and K<sub>1</sub> are water-solubilized with polysorbate 80.

- (a) 0.7 mg vitamin A equals 2,300 USP units = 2,300 IU.
- (b) 10 mcg ergocalciferol equals 400 USP units = 400 IU.
- (c) 7 mg vitamin E equals 7 USP units = 7 IU.
- (d) IU = international units.

With Butylated Hydroxyanisole – 14 mcg; Butylated Hydroxytoluene – 58 mcg; Mannitol – 375 mg; Polysorbate 20 - 0.8 mg; Polysorbate 80 - 50 mg; Sodium hydroxide for pH adjustment.

M.V.I. Pediatric (multiple vitamins for injection) provides a combination of oil-soluble and water-soluble vitamins, formulated for incorporation into intravenous infusions after reconstitution. The liposoluble vitamins A, D, E and K<sub>1</sub> have been solubilized in an aqueous medium with polysorbate 80, permitting intravenous administration of these vitamins.

## 13 NONCLINICAL TOXICOLOGY

### 13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenicity, mutagenicity, and fertility studies have not been performed with M.V.I. Pediatric.

## 16 HOW SUPPLIED/STORAGE AND HANDLING

M.V.I. Pediatric for injection is supplied as a single-dose vial of lyophilized powder for reconstitution available as:

- Box of 10 single-dose glass fliptop vials (NDC 61703-421-53)

See Description section for vitamin strengths [*see Description (11)*].

Minimize the exposure of M.V.I. Pediatric to light, because vitamins A, D and riboflavin are light sensitive. Store under refrigeration, 2 to 8°C (36 to 46°F).



## 17 PATIENT COUNSELING INFORMATION

Instruct patients (if age appropriate) and caregivers:

- To watch for and immediately report signs of allergic reactions (i.e., urticaria, shortness of breath, wheezing, and angioedema).
- To watch for and immediately report signs of hypervitaminosis A, manifested by nausea, vomiting, headache, dizziness, and blurred vision, if patients have renal impairment.
- To report other adverse reactions such as rash, erythema, pruritus, headache, dizziness, agitation, anxiety, and diplopia.
- That patients on warfarin anticoagulant therapy will be monitored periodically for blood prothrombin levels to determine the appropriate dose of warfarin.
- About the significance of periodic monitoring of blood vitamin concentrations to determine if vitamin deficiencies or excesses are developing.
- About the need to monitor renal function, calcium, phosphorus, aluminum, and vitamin A levels in patients with renal impairment.

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