

## Pediatric Antiretroviral Dosing in Resource-Limited Settings

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This dosing card contains information on pediatric ARV drugs commonly used in resource-limited settings for which there are pediatric formulations or sufficient information and evidence to provide guidance on prescribing and dosing. The weight based tables were compiled by estimation of the body surface area, and decisions about dosing are based on the manufacturer's information, ARV drug formulation, data from clinical trials and expert pediatric pharmacology consultation. Optimal dosing is given for single ARV drugs and where possible combination solid fixed dose combinations.

### ABACAVIR (Ziagen®, ABC)

#### Formulations

Oral solution: 20 mg/ml; Tablet: 300 mg

#### Dosing

Target dose: <16 years or <37.5 kg: 8 mg/kg/dose twice daily  
Maximum dose: >16 years or ≥37.5 kg: 300 mg/dose twice daily  
Note: Once-daily dosing is not yet approved for children.

#### General comments

Parents must be warned about potential hypersensitivity reaction.  
ABC should be stopped permanently if hypersensitivity reaction occurs.  
No food restrictions.

**Tablets:** Can be crushed and contents mixed with small amount of water or food and immediately ingested. Store at room temperature of 20°C to 25°C.  
**Oral solution:** Store at room temperature of 20°C to 25°C; may be refrigerated.

### DIDANOSINE (Videx®, DDI)

#### Formulations

Pediatric powder for oral solution: 10 mg/ml when reconstituted with water (in many countries must be made up with additional antacid)  
Chewable tablets: 25 mg, 50 mg, 100 mg, 150 mg, 200 mg  
Enteric-coated beadlets in capsules (EC): 125 mg, 200 mg, 250 mg, 400 mg (designed for once-daily dosing)

#### Dosing

Target dose: <3 months: 50 mg/m<sup>2</sup>/dose twice daily  
Target dose: ≥ 3 months <13 years: 90 - 120 mg/m<sup>2</sup>/dose twice daily  
Maximum dose: ≥13 years or >60 kg: 200 mg/dose twice daily or 400 mg once daily.  
Once-daily dosing for chewable tablets is authorized in United Kingdom for children >6 years.

#### General comments

DDI is degraded rapidly unless given as an enteric formulation or combined with buffering agents or antacids. It is recommended to administer ddl 30 minutes before or two hours after meals.

**Oral suspension:** Difficult to use and should be avoided. Must be kept refrigerated; stable for 30 days; must be well shaken.

**Tablets:** At least two tablets of appropriate strength must be used at one time for adequate buffering (e.g. if the child's dose is 50 mg, administer two 25 mg tablets instead of one 50-mg tablet). Tablets should be chewed, crushed or dispersed in water before they are taken; should not be swallowed whole.

**Enteric-coated beadlets in capsules:** Can be opened and sprinkled on a small amount of food.

### LAMIVUDINE (EpiVir®, 3TC)

#### Formulations

Oral solution: 10 mg/ml; Tablet: 150 mg

#### Dosing

Target dose: 4 mg/kg/dose twice daily to a maximum of 150 mg/dose twice daily  
Dose at <30 days: 2 mg/kg/dose twice daily

Dose at ≥30 days: 4 mg/kg/dose twice daily  
Dose at >50 kg: 150 mg/dose twice daily  
Once-daily dosing is not yet approved for children.

#### General comments

Well tolerated, no food restrictions. Also active against hepatitis B.

**Oral solution:** Store solution at room temperature (i.e. 25 °C). Use within one month of opening.

**Tablets:** Store at 25 °C (permitted range: 15 °C to 30 °C). Can be crushed and contents mixed with a small amount of water or food and immediately taken.

### STAVUDINE (Zerit®, d4T)

#### Formulations

Oral solution: 1 mg/ml; Capsules: 15 mg, 20 mg, 30 mg, 40 mg

#### Dosing

Target dose: 1 mg/kg  
Dose at <30 kg: 1 mg/kg/dose twice daily  
Dose at 30 to 60 kg: 30 mg/dose twice daily  
Maximum dose at >60 kg: 40 mg/dose twice daily

#### General comments

Well tolerated. Do not use d4T with ZDV due to antagonistic effect.

**Oral solution:** Palatable and well tolerated but requires refrigeration after reconstitution. Powder for oral solution should be protected from excessive moisture and stored in tightly closed containers at 25°C (permitted range: 15°C to 30°C). After constitution, needs refrigeration and storage in original container; discard any unused portion after 30 days. Must be well shaken before use.

**Capsules:** Can be opened and mixed with small amount of food or water (stable in solution for 24 hours if kept refrigerated).

### ZIDOVUDINE (Retrovir®, ZDV, AZT)

#### Formulations

Syrup: 10 mg/ml; Capsules: 100 mg and 250 mg sizes; Tablet: 300 mg

#### Dosing

Target dose for infants >6 weeks old: 180-240 mg/m<sup>2</sup> per dose given twice daily (total daily dose of 360-480 mg/m<sup>2</sup>)  
Maximum dose: 300 mg/dose twice daily

#### General comments

For children with suspected nervous system involvement, a dose of 240mg/m<sup>2</sup> per dose given twice daily may be beneficial. Do not use d4T with ZDV due to antagonistic effect. No food restrictions. Use with caution in children with anaemia due to potential for bone marrow suppression.

**Syrup:** Stable at room temperature but light-sensitive; store in glass jar.

**Capsules:** May be opened and dispersed in water or on to a small amount of food and immediately ingested. Store at 15°C to 25°C.

**Tablets:** 300 mg tablets are often not scored; may be cut in half with a tablet splitter in a pharmacy. Tablets may be crushed and combined with a small amount of food or water and immediately ingested. Store at 15°C to 25°C.

### EFAVIRENZ (Stocrin®, Sustiva®, EFV)

#### Formulations

Syrup: 30 mg/ml. Note: syrup has lower bioavailability and ratio of 1.3 syrup to solid formulation is suggested to achieve an equivalent dose.  
Capsules: 50 mg, 100 mg, 200 mg; Tablets: 600 mg

#### Dosing

Target dose for children >3years: 19.5 mg/kg/day (syrup) or 15 mg/kg/day (capsule/tablet)  
Weight >40 kg: 600 mg once daily

### General comments

EFV is not approved for children <3 years. Store at 25°C (permitted range: 15°C to 30°C). EFV can be given with food but if taken with food, especially high-fat meals, absorption is increased by an average of 50%. Best given at bedtime to reduce CNS side-effects, especially during first two weeks.

**Capsules:** May be opened and added to small amount of food or liquid; they have a very peppery taste but can be mixed with sweet foods to disguise taste.

### NEVIRAPINE (Viramune®, NVP)

#### Formulations

Oral suspension: 10 mg/ml; Tablet: 200 mg

#### Dosing

Target dosing for maintenance: 160-200 mg/m<sup>2</sup>/dose to a maximum dose of 200 mg taken twice daily

Special considerations on dosing:

- Induction dose: once daily for first 14 days; it is generally half the daily maintenance dose given once daily except where the maintenance dose is divided unequally between a.m. and p.m.
- Maintenance dose: 160 - 200 mg/m<sup>2</sup> given twice daily adjusted for more aggressive dosing in younger ages.
- For children 14-24.9 kg: the suggested dose is 1 tablet a.m. and 0.5 tablet p.m. If a mild rash occurs during the first 14 days of induction dosing, continue once daily dosing and only escalate dose once the rash has subsided and the dose is well tolerated. If a severe rash occurs (especially if accompanied by fever, blistering or mucosal ulcerations), discontinue drug.

#### General comments

Parents must be warned about a potential severe, life-threatening rash during the 14-day lead-in period. The once-daily induction dose is used to reduce the frequency of rash. NVP should be permanently discontinued and not restarted in children who develop severe rash. Drug interactions: avoid nevirapine if rifampicin is coadministered. Can be given without regard to food. Store at 25°C (permitted range 15°C to 30°C).

**Oral suspension:** Must be well shaken.

**Tablets:** Are scored and can be divided into two equal parts to give a 100 mg dose; can be crushed and combined with a small amount of water or food and immediately administered.

### LOPINAVIR/RITONAVIR (Kaletra®, LPV/r)

#### Formulations

Oral solution: 80 mg/ml lopinavir plus 20 mg/ml ritonavir

Capsules: 133.3 mg lopinavir plus 33.3 mg ritonavir

Tablets: 200 mg lopinavir plus 50 mg ritonavir

#### Dosing

Lopinavir target doses:

- 5-7.9 kg: 16 mg/kg/dose twice daily; 8-9.9 kg: 14 mg/kg/dose twice daily  
10-13.9 kg: 12 mg/kg/dose twice daily; 14-39.9 kg: 10 mg/kg/dose twice daily

Ritonavir target doses:

- 7-15 kg: 3 mg/kg/dose twice daily; 15-40 kg: 2.5 mg/kg/dose twice daily  
Maximum dose: 400 mg lopinavir plus 100 mg ritonavir twice daily

#### General comments

Should be taken with food. Oral solution and capsules should be refrigerated; however, can be stored at room temperature up to 25°C for two months; at >25°C drug degrades more rapidly. There are many drug-to-drug interactions because RTV inhibits cytochrome P450.

**Oral solutions:** Low volume but bitter taste.

**Capsules:** Large. Should not be crushed or opened; must be swallowed whole.

**Tablets:** No food restrictions although bioavailability is increased when administered with food. Cannot be split.

### NELFINAVIR (Viracept®, NFV)

#### Formulations

Powder for oral suspension: 50 mg per 1 gram scoop (200 mg per level teaspoon of 5 ml); Tablet: 250 mg, 625 mg

#### Dosing

<10 kg: dose listed is targeted to achieve a dose of ~75 mg/kg/dose twice daily; 10 kg to 19.9 kg: dose listed is targeted to achieve a dose of ~60 mg/kg/dose twice daily; 20 kg: maximum recommended dose of 1250 mg twice daily

#### General comments

Doses for children <2 years of age are not well established. Powder and tablets can be stored at room temperature. Must be taken with food to improve absorption. Because of difficulties with powder, the use of crushed tablets is preferred (even for infants). Tabs may be halved, or crushed and dispersed in water or on to a small amount of food and immediately ingested.

### RITONAVIR (Norvir®, RTV)

#### Formulations

Oral solution: 80 mg/ml; Capsule: 100 mg

#### Dosing (from Norvir® package insert)

Rarely used as sole PI except for TB co-treatment in children < 3 years. Target Dose: > 1 month: 350-400 mg/m<sup>2</sup> /dose twice daily. Maximum dose 600 mg twice daily (when used as single PI therapy).

Special considerations on dosing: Initiate therapy at 250 mg/m<sup>2</sup>/dose twice daily and increase as tolerated to full dose over 5 days. Usually used at lower doses as a pharmacokinetic enhancer with other PIs.

#### General comments

Should be taken with food. Techniques to increase tolerance in children; mix oral solution with milk, dull taste buds with ice chips, coat mouth with peanut butter, follow dose with strong-tasting food such as cheese or gum. There are many drug-drug interactions because it is a potent inhibitor of cytochrome P450.

**Oral solution:** Low volume but bitter taste. Do not refrigerate, store at room temperature (20°-25°C) in original container, limited shelf life of 6 months.

**Capsule:** Should be refrigerated, can store at room temperature 25°C if used within 30 days.

### STAVUDINE (d4T) + LAMIVUDINE (3TC)

#### Formulations

Oral solution: stavudine 10 mg plus lamivudine 40 mg/5ml

Tablets: d4T (40 mg) plus 3TC (150 mg) or d4T (30 mg) plus 3TC (150 mg)

#### Dosing

Target dose: stavudine: 1 mg/kg/dose twice daily; lamivudine: 4 mg/kg/dose twice daily

Maximum dose: One 40 mg d4T-based tablet twice daily

#### General comments

See comments under individual drug components.

**Tablets:** Preferably, should not be split unless scored.

### STAVUDINE (d4T) + LAMIVUDINE (3TC) + NEVIRAPINE (NVP)

#### Formulations

Tablet: d4T (40 mg) plus 3TC (150 mg) plus NVP (200 mg) or d4T (30 mg) plus 3TC (150 mg) plus NVP (200 mg)

As of June 2006 not yet WHO prequalified:

Tablet: 6 mg stavudine / 30 mg lamivudine / 50 mg nevirapine (baby)

Tablet: 12 mg stavudine / 60 mg lamivudine / 100 mg nevirapine (junior)

Suspension: stavudine 10 mg/5 ml plus lamivudine 40 mg plus nevirapine 70 mg

#### Dosing

Target dose: stavudine: 1 mg/kg/dose twice daily; lamivudine: 4

mg/kg/dose twice daily; nevirapine: 160-200 mg/m<sup>2</sup>/dose twice daily

Maximum dose: One 40 mg d4T-based tablet twice daily

#### General comments

Contains a fixed dose of NVP, therefore cannot be used for nevirapine induction as nevirapine dose escalation required (see NVP dosing recommendations). See comments under individual drug components.

**Tablets:** Preferably, should not be split unless scored.

### ZIDOVUDINE (ZDV) + LAMIVUDINE (3TC) (Combivir®)

#### Formulation

Tablet: ZDV (300 mg) plus 3TC (150 mg)

#### Dosing

Target dose:

Zidovudine: 180 - 240 mg/m<sup>2</sup>/dose twice daily

Lamivudine: 4 mg/kg/dose twice daily

Maximum dose: 1 tablet/dose twice daily

#### General comments

See comments under individual drug components.

**Tablets:** No food restrictions. Can be crushed and contents mixed with a small amount of water or food and immediately taken. Store between 2°C and 30°C.

### ZIDOVUDINE (ZDV) + LAMIVUDINE (3TC) + ABACAVIR (ABC)(Trizivir®)

#### Formulation

Tablet: ZDV (300 mg) plus 3TC (150 mg) plus ABC (300 mg)

#### Dosing

Target dose:

Zidovudine: 180-240 mg/m<sup>2</sup>/dose twice daily;

Lamivudine: 4 mg/kg/dose twice daily; Abacavir: 8 mg/kg/dose twice daily

Maximum dose: 1 tablet/dose twice daily

#### General comments

See comments under individual drug components. Parents must be warned about potential hypersensitivity reaction. ABC should be stopped permanently if hypersensitivity reaction occurs.

**Tablets:** Should not be split.

### TRIMETHOPRIM/SULFAMETHOXAZOLE (Cotrimoxazole, Septrim®, Bactrim®, TMP/SMZ)

Dosing Recommendations for Cotrimoxazole Prophylaxis for Infants and Children		
Age Range	Suspension 40 mg TMP/200 mg SMZ per 5ml	Single-strength tablet 80 mg TMP/400 mg SMZ
<6 months	2.5 ml daily	1/4 tablet daily
6 months-5 years	5 ml daily	1/2 tablet daily
5-14 years	10 ml daily	1 tablet daily
>14 years	–	2 single-strength or 1 double-strength tablet daily

Weight range (kg)	Abacavir (Ziagen <sup>®</sup> , ABC)		Didanosine (Videx <sup>®</sup> , DDI)			Lamivudine (EpiVir <sup>®</sup> , 3TC)		Stavudine (Zerit <sup>®</sup> , d4T)		Zidovudine (Retrovir <sup>®</sup> , ZDV, AZT)			Efavirenz (Stocrin <sup>®</sup> , Sustiva <sup>®</sup> , EFV)	Nevirapine (Viramune <sup>®</sup> , NVP)			
	8 mg/kg/dose TWICE daily		90-120 mg/ m <sup>2</sup> /dose TWICE daily	120 mg/ m <sup>2</sup> /dose TWICE daily	180-240 mg/ m <sup>2</sup> /dose ONCE daily	4 mg/kg/dose TWICE daily		1 mg/kg/dose TWICE daily		180-240 mg/m <sup>2</sup> /dose TWICE daily			Dose as shown ONCE daily for children 3 YEARS AND OLDER	INDUCTION DOSE: 160-200 mg/m <sup>2</sup> /dose ONCE daily		MAINTENANCE DOSE: 160-200 mg/m <sup>2</sup> /dose TWICE daily	
	20 mg/ml solution	300 mg tablets	10 mg/ml suspension	25, 50, 100mg chewable tablets	125, 200, 250, 400 mg EC capsules	10 mg/ml solution	150 mg tablets	1 mg/ml solution	15, 20, 30 mg capsules	10 mg/ml syrup	100 mg capsules	300 mg tablets	50, 100, 200 mg capsules, 600 mg tablets	10 mg/ml suspension	200 mg tablets	10 mg/ml suspension	200 mg tablets
5 - 5.9	2 ml		4 ml	25 mg + 25 mg tabs		3 ml		6 ml		6 ml				6 ml		6 ml	
6 - 6.9	3 ml		5 ml	25 mg + 25 mg tabs		3 ml		7 ml	10 mg (as 0.5 x 20 mg)	7 ml				7 ml		7 ml	
7 - 7.9	4 ml		6 ml	25 mg + 25 mg tabs		4 ml		8 ml	10 mg (as 0.5 x 20 mg)	8 ml				8 ml		8 ml	
8 - 8.9	4 ml		6 ml	25 mg + 25 mg tabs		4 ml		9 ml	10 mg (as 0.5 x 20 mg)	9 ml	1 cap			9 ml		9 ml	
9 - 9.9	4 ml		6 ml	25 mg + 25 mg tabs		4 ml		10 ml	10 mg (as 0.5 x 20 mg)	10 ml	1 cap			9 ml	0.5 tab	9 ml	0.5 tab
10 - 10.9	5 ml		6 ml	50 mg + 25 mg tabs in am 25 mg + 25 mg tabs in pm	125 mg EC cap	5 ml			15 mg cap	10 ml	1 cap		200 mg cap	10 ml	0.5 tab	10 ml	0.5 tab
11 - 11.9	5 ml	0.5 tab	7 ml	50 mg + 25 mg tabs	125 mg EC cap	5 ml			15 mg cap	10 ml	1 cap		200 mg cap	10 ml	0.5 tab	10 ml	0.5 tab
12 - 13.9	6 ml	0.5 tab	7 ml	50 mg + 25 mg tabs	125 mg EC cap	6 ml	0.5 tab		15 mg cap	11 ml	1 cap		200 mg cap	11 ml	0.5 tab	11 ml	0.5 tab
14 - 16.9		0.5 tab	8 ml	50 mg + 50 mg tabs in am 50 mg + 25 mg tabs in pm	200 mg EC cap		0.5 tab		20 mg cap		2 caps in am 1 cap in pm	0.5 tab	200 mg + 50 mg caps		0.5 tab		1 tab in am 0.5 tab in pm
17 - 19.9		0.5 tab	9 ml	50 mg + 50 mg tabs	200 mg EC cap		0.5 tab		20 mg cap		2 caps in am 1 cap in pm	0.5 tab	200 mg + 50 mg caps		1 tab		1 tab in am 0.5 tab in pm
20 - 24.9		1 tab in am 0.5 tab in pm		100 mg + 25 mg tabs	250 mg EC cap		1 tab in am 0.5 tab in pm		20 mg cap		2 caps	0.5 tab	200 mg + 100 mg caps		1 tab		1 tab in am 0.5 tab in pm
25 - 29.9		1 tab		100 mg + 25 mg tabs	250 mg EC cap		1 tab		30 mg cap		2 caps	1 tab in am 0.5 tab in pm	200 mg + 100 mg + 50 mg caps		1 tab		1 tab
30 - 34.9		1 tab		100 mg + 25 mg tabs	250 mg EC cap		1 tab		30 mg cap		3 caps	1 tab	200 mg cap (x2)		1 tab		1 tab
35- 39.9		1 tab		100 mg + 25 mg tabs	250 mg EC cap		1 tab		30 mg cap		3 caps	1 tab	200 mg cap (x2)		1 tab		1 tab

Weight range (kg)	Lopinavir/ritonavir (Kaletra <sup>®</sup> , LPV/r)			Nelfinavir (Viracept <sup>®</sup> , NFV)		Ritonavir (Norvir <sup>®</sup> , RTV)		Stavudine + Lamivudine	Stavudine + Lamivudine + Nevirapine	Zidovudine + Lamivudine (Combivir <sup>®</sup> )	Zidovudine + Lamivudine + Abacavir (Trizivir <sup>®</sup> )
	10-16 mg/kg/dose TWICE daily			Target dosing <10 kg: 75 mg/kg/dose >10 kg to 19.9kg: 60 mg/kg/dose >20 kg: max dose of 1250 mg TWICE daily		STARTING DOSE: 250 mg/m <sup>2</sup> / dose TWICE daily	MAINTENANCE DOSE: 400 mg/m <sup>2</sup> / dose TWICE daily	Dose shown TWICE daily	Dose shown TWICE daily	Dose shown TWICE daily	Dose shown TWICE daily
	80 mg lopinavir/ 20 mg ritonavir per ml solution	133 mg lopinavir/33 mg ritonavir capsules	200 mg lopinavir/50 mg ritonavir tablets	250 mg tablets	625 mg tablets	80 mg/ml solution	80 mg/ml solution	30 mg d4T/ 150 mg 3TC tablets	30 mg d4T/ 150 mg 3TC/ 200 mg NVP tablets	300 mg ZDV / 150 mg 3TC tablets	300 mg ZDV/ 150 mg 3TC/ 300 mg ABC tablets
5 - 5.9	1 ml			2 tabs		1 ml	1.5 ml				
6 - 6.9	1.5 ml			2 tabs		1 ml	2 ml				
7 - 7.9	1.5 ml	1 cap		3 tabs in am 2 tabs in pm		1 ml	2 ml				
8 - 8.9	2 ml	1 cap		3 tabs		1.5 ml	2 ml				
9 - 9.9	2 ml	1 cap		3 tabs		1.5 ml	2.5 ml				
10 - 10.9	2 ml	1 cap		3 tabs		1.5 ml	2.5 ml	0.5 tab	0.5 tab		
11 - 11.9	2 ml	1 cap		3 tabs		1.5 ml	2.5 ml	0.5 tab	0.5 tab		
12 - 13.9	2 ml	2 caps in am 1 cap in pm	1 tab	4 tabs		1.5 ml	3 ml	0.5 tab	0.5 tab		
14 - 16.9	2 ml	2 caps in am 1 cap in pm	1 tab	4 tabs		2 ml	3 ml	1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm	0.5 tab	0.5 tab
17 - 19.9	2.5 ml	2 caps in am 1 cap in pm	1 tab	5 tabs	2 tabs			1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm	0.5 tab	0.5 tab
20 - 24.9	3 ml	2 caps	1 tab	5 tabs	2 tabs			1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm
25 - 25.9	3.5 ml	2 caps	2 tabs in am 1 tab in pm	5 tabs	2 tabs			1 tab	1 tab	1 tab in am 0.5 tab in pm	1 tab in am 0.5 tab in pm
30 - 34.9	4 ml	3 caps	2 tabs	5 tabs	2 tabs			1 tab	1 tab	1 tab	1 tab
35 - 39.9	5 ml	3 caps	2 tabs	5 tabs	2 tabs			1 tab	1 tab	1 tab	1 tab