

# Appendix 1: NORMAL HEART RATES, BLOOD PRESSURES, OXYGEN SATURATIONS, AND CENTRAL VENOUS PRESSURE FOR INFANTS AND CHILDREN

Age	Range of normal heart rates (beats per minute)	Range of normal systolic blood pressures, (mmHg)	Range of Normal Respiratory Rates, (Breaths per minute, spontaneous respiration)	Normal Pulse Oximeter Saturation, Room Air, (SpO <sub>2</sub> %)	Range of Normal Central Venous Pressure (mm Hg, spontaneous ventilation)
Neonate (<30 days)	120–160	60–75	30-50	93-98	5-12
1–6 months	110–140	65–85	24-40	94-99	4-10
6–12 months	100–140	70–90	20-36	≥ 95	4-8
1–2 years	90–130	75–95	20-32	≥ 95	4-8
3–5 years	80–120	80–100	20-30	≥ 95	4-8
6–8 years	75–115	85–105	18-26	≥ 95	4-8
9–12 years	70–110	90–115	14-20	≥ 95	4-8
13–16 years	60–110	95–120	12-16	≥ 95	4-8
>16 years	60–100	100–125	10-16	≥ 95	4-8

**Appendix 1: NORMAL HEART RATES, BLOOD PRESSURES, AND CENTRAL**

# Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS IN THE PERIOPERATIVE PERIOD

Dean B. Andropoulos, M.D.

Drug doses and treatments are those commonly recommended; each patient's treatment must be individualized, drug doses double checked for accuracy, and drug concentrations and modes of administration used according to local guidelines. Information is current at the time of publication; however, the practitioner must always be aware of new recommendations, and is responsible for determining the best course of treatment. Consult the textbook, hospital formulary, or authoritative internet resources, for a complete listing of indications, contraindications, interval dosing schedules, and side effects of these drugs and treatments. All drugs are intravenous unless otherwise noted. Drugs denoted with an asterisk (\*) are not U.S. FDA approved as of February 2014. Source for dosing information is the Texas Children's Hospital Drug Formulary, current as of February 2014, except where otherwise noted in the references.

Category	Drug/ Treatment	Bolus/ Loading Dose	Infusion/ Continuous Dose
<u>Anesthetic , Sedative, and Analgesic Agents</u>			
Opioids	Fentanyl	1-10 mcg/kg; 50- 200 mcg/kg total dose	5-20 mcg/kg/hr
	Remifentanyl	0.25-1 mcg/kg	0.05-2 mcg/kg/min
	Sufentanyl	0.1-5 mcg/kg	0.1-3 mcg/kg/hr

**Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS**

	Morphine	0.03-0.2 mg/kg	0.01-0.05 mg/kg/hr
	Meperidine(shivering)	1-2 mg/kg	NA
	Methadone	0.1 mg/kg	NA
	Hydromorphone	0.02 mg/kg	0.006 mg/kg/hr
<b>Benzodiazepines</b>	Midazolam IV	0.03-0.1 mg/kg	0.05-0.1 mg/kg/hr
	Midazolam PO	0.5-1 mg/kg	NA
	Lorazepam	0.25-0.1 mg/kg	NA
	Diazepam IV	0.05-0.3 mg/kg max 10 mg	NA
	Diazepam PO	0.04-0.3 mg/kg max 10 mg	NA
<b>Barbiturates</b>	Thiopental	1-6 mg/kg	NA
	Pentobarbital	1-6 mg/kg	NA
	Methohexital	1-3 mg/kg	NA
<b>Other Sedative/Analgesic Agents</b>	Ketamine IV	1-2 mg/kg	NA
	Ketamine IM	5-10 mg/kg	NA
	Etomidate	0.1-0.3 mg/kg	NA
	Propofol	1-3 mg/kg	50-200 mcg/kg/min
	Scopolamine	10 mcg/kg	NA
	Dexmedetomidine	0.3-1 mcg/kg	0.3-0.7 mcg/kg/hr
<b>Neuromuscular Blocking Drugs</b>	Vecuronium	0.1-0.3 mg/kg	0.05-0.1

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<b>and Reversals</b>			mg/kg/hr
	Rocuronium IV	0.6-1.2 mg/kg	NA
	Rocuronium IM	2 mg/kg	NA
	Atracurium	0.4-0.5 mg/kg	NA
	Cisatracurium	0.15-0.2 mg/kg	NA
	Pancuronium	0.1-0.2 mg/kg	NA
	Succinylcholine IV	1-2 mg/kg	NA
	Succinylcholine IM	4 mg/kg	NA
	Neostigmine	40-80 mcg/kg	NA
	Glycopyrrolate	8-16 mcg/kg	NA
	Sugammadex*[1]	2-4 mg/kg	NA
<b>Vasoactive Drugs</b>			
<b>Inotropes/Vasoconstrictors</b>	Epinephrine	0.5-10 mcg/kg	0.03-0.1 mcg/kg/min
	Atropine IV	10-20 mcg/kg	NA
	Atropine IM	20-40 mcg/kg	NA
	Phenylephrine	0.5-3 mcg/kg	0.05-0.5 mcg/kg/min
	Ephedrine	0.05-0.2 mg/kg	NA
	Calcium chloride	10 mg/kg	5-10 mg/kg/hr
	Calcium gluconate	30 mg/kg	NA
	Dopamine	NA	3-20 mcg/kg/min
	Dobutamine	NA	
			3-20 mcg/kg/min

**Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS**

	Milrinone	25-75 mcg/kg	0.25-0.75 mcg/kg/min
	Norepinephrine	NA	0.05-0.1 mcg/kg/min
	Vasopressin	NA	0.02-0.05 units/kg/hr
	Isoproterenol	NA	0.01-0.1 mcg/kg/min
	Levosimendan [2-4]	6-12 mcg/kg	0.1-0.2 mcg/kg/min
	Triiodothyronine (T3)[5]	NA	0.05 mcg/kg/hr
<b>Vasodilators/Antihypertensives</b>	Sodium nitroprusside	NA	0.3-5 mcg/kg/min
	Nitroglycerine	NA	0.3-5 mcg/kg/min
	Prostaglandin E <sub>1</sub>	NA	0.0125-0.05 mcg/kg/min
	Prostacyclin (Flolan, epoprostenol, PGI <sub>2</sub> )	NA	2-5 ng/kg/min
	Nesiritide	NA	0.01-0.03 mcg/kg/min
	Fenoldepam	NA	0.025-0.3 mcg/kg/min initially, titrate to max 1.6 mcg/kg/min
	Nicardipine	NA	0.1-0.3 mg/kg/hr; max

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			15 mg/hr
	Hydralazine	0.1-0.2 mg/kg	NA
	Phentolamine	0.1-0.2 mg/kg on CPB	NA
	Phenoxybenzamine	0.25 -1 mg/kg on CPB	
	Labetalol	0.25-0.5 mg/kg	NA
	Enalaprilat	5-10 mcg/kg	NA
	Sildenafil[6,7]	0.35-0.44 mg/kg over 1-3h	0.067 mg/kg/hr
<b>Antiarrhythmics/<math>\beta</math>-blockers</b>	Lidocaine	1-2 mg/kg	20-50 mcg/kg/min
	Procainamide	10-15 mg/kg	20-80 mcg/kg/min
	Esmolol	250-500 mcg/kg	50-300 mcg/kg/min
	Propranolol	0.01-0.1 mg/kg	NA
	Amiodarone	5 mg/kg over 10-15", may repeat x 2 to max 15 mg/kg	NA
	Verapamil	0.1-0.3 mg/kg	NA
	Adenosine	25-50 mcg/kg – double if ineffective	NA

**Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS**

	Magnesium sulfate	25-50 mg/kg over 30-60"	NA
	Digoxin	8-10 mcg/kg 1 <sup>st</sup> loading dose	NA
<u>Antibiotics</u>	Cefazolin	25 mg/kg max 1 g	NA
	Ampicillin	50 mg/kg, max 1 g	NA
	Vancomycin	15 mg/kg max 1 g	NA
	Gentamycin	2.5 mg/kg max 120 mg	NA
	Nafcillin	50 mg/kg max 2 g	NA
	Clindamycin	10 mg/kg	NA
	Cefuroxime	25-30 mg/kg	NA
	Cefoxitin	30-40 mg/kg max 2 g	NA
	Piperacillin/Tazobactam	100 mg/kg piperacillin component, max 4 g	
<u>Non-Steroidal Anti-Inflammatory Drugs/Non-Opioid Analgesics</u>	Ketorolac	0.5 mg/kg max 30 mg	NA
	Acetaminophen PO	15 mg/kg max 1000 mg	NA
	Acetaminophen PR	20-30 mg/kg (one time)	NA
	Acetaminophen IV	12.5-15 mg/kg max 1000 mg	NA
	Ibuprofen IV	5-10 mg/kg; max	NA



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		400 mg	
	Ibuprofen PO	5-10 mg/kg; max 400 mg	NA
<b><u>Malignant Hyperthermia Treatment</u></b>	Dantrolene	2.5 mg/kg; may repeat x 3 up to 10 mg/kg	NA
<b><u>Local Anesthetics</u></b>	Lidocaine	Max 5 mg/kg	NA
	Bupivacaine	Max 2.5 mg/kg	NA
	Levobupivacaine	Max 2.5 mg/kg	NA
	Ropivacaine	Max 2 mg/kg	NA
	Tetracaine (spinal—infants < 6 months)	0.4-0.8 mg/kg	NA
<b><u>Local Anesthetic Toxicity</u></b>	20% Intralipid[8]	1 ml/kg; repeat x 2 to max 3 ml/kg	0.25 ml/kg/min
<b><u>Corticosteroids</u></b>	Methylprednisolone	1-30 mg/kg depending on indication	5.4 mg/kg/hr x 23 hours for spinal cord injury
	Dexamethasone	0.25-1 mg/kg. max 20 mg	NA
	Hydrocortisone	1-2 mg/kg	NA
<b><u>Anticoagulants</u></b>	Heparin	CPB: 300-400 units/kg	NA
	Bivalirudin[9,10]	Interventional cardiac cath: 0.75 mg/kg CPB: 1 mg/kg; plus 1 mg/kg CPB prime	Cath: 1.75 mg/kg/hr CPB: 2.5 mg/kg/hr

**Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS**

	Argatroban	CPB:35-100 mcg/kg (ACT >400 sec)	2-10 mcg/kg/min
	Antithrombin III	50 units/kg; target levels 80-120% of normal	NA
<b><u>Hemostasis Agents</u></b>	ε-aminocaproic acid	75 mg/kg patient; 75 mg/kg CPB prime	75 mg/kg/hr
	Tranexamic acid	10-100mg/kg	1-10 mg/kg/hr
	Recombinant factor VIIa	30-90 mcg/kg; may repeat x 2	
<b><u>Diuretics</u></b>	Furosemide	0.5-1 mg/kg max 40 mg	0.1-0.4 mg/kg/hr
	Bumetanide	0.015-0.1 mg/kg max 2.5 mg	NA
	Mannitol	0.25-1 g/kg	NA
<b><u>Perioperative Nausea &amp; Vomiting/Gastrointestinal Prophylaxis</u></b>	Ondansetron	0.1 mg/kg max 4 mg	NA
	Granisetron	10-20 mcg/kg	NA
	Metaclopramide	0.1-0.2 mg/kg max 10 mg	NA
	Promethazine (over age 2 years only)	0.25-0.5 mg/kg Max 25 mg	
	Sodium citrate PO	30 ml	NA
<b><u>Antihistamines</u></b>	Diphenhydramine	1-2 mg/kg max 50 mg	NA
	Ranitidine	1 mg/kg max 50	NA

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		mg	
	Famotidine	0.5 mg/kg, max 40 mg	NA
<b><u>Alkalinizing Agents</u></b>	Sodium bicarbonate (dilute 1:1 sterile H <sub>2</sub> O for neonates)	1-2 meq/kg	NA
	Tromethamine (THAM)0.3 M solution	3-6 ml/kg	NA
<b><u>Inhaled Agents/Bronchodilators</u></b>			<b><u>Inspired dose</u></b>
	Sevoflurane		1-8%
	Isoflurane		0.5-3%
	Desflurane		2-12%
	Nitrous Oxide (N <sub>2</sub> O)		50-75%
	Nitric Oxide (NO)		5-20 ppm
	Levalbuterol	8-12 MDI puffs per ETT; 0.075- 0.15 mg/kg nebulized in 3 ml normal saline	NA
	Racemic epinephrine	0.25-0.5 mL of 2.25% racemic epinephrine in 3 mL normal saline	NA
	Prostacyclin (Iloprost, PGI <sub>2</sub> )[11]	2.5-5 mcg nebulized in 3 ml normal saline	NA
<b><u>Electrolytes/Dextrose</u></b>	25% Dextrose in Water  (50% dextrose diluted 1:1)	0.25-0.5 ml/kg	NA

**Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS**

	Potassium chloride (KCl)	0.5-1 meq/kg	NA
	3% NaCl	3-5 ml/kg	NA
<u>Insulin (regular)</u>	Insulin (regular): Dose based on plasma glucose levels	0.02-0.1 units/kg	0.02-0.1 units/kg/hr
<u>Sedation/Analgesia Reversal</u>	Naloxone	1-10 mcg/kg	NA
	Flumazenil	1-5 mcg/kg; repeat as needed, max dose 1 mg	NA
<u>Immunosuppressants (Transplant)</u>	Basiliximab	<35 kg: 10 mg; >35 kg: 20 mg	NA
	Mycophenolate	15 mg/kg max 1.5 g	NA
<u>Miscellaneous Drugs</u>	Caffeine citrate	10-20 mg/kg	NA
<u>Transfusions</u>	Packed red blood cells	10-15 ml/kg	NA
	Whole blood	10-15 ml/kg	NA
	Platelets	1 unit/5 kg will increase plt count by 50,000; 1 pheresis unit=6 random donor units	NA
	Cryoprecipitate	1 unit per 5 kg; max 4 units	NA
	Fresh Frozen Plasma	10-20 ml/kg	NA
<u>Intravascular Volume Expansion</u>	5% albumin	10-20 ml/kg	NA
	25% albumin	2-4 ml/kg; 0.5-1 g/kg	NA

	6% hetastarch	10-20 ml/kg, max 15 ml/kg/24 hr	NA
<u>Direct Current Cardioversion/Defibrillation</u>	External synchronized cardioversion	0.5 J/kg; increase to max 1 J/kg; max 100 kg	NA
	External defibrillation	2-5 J/kg; increase if ineffective; max 200 J biphasic; 360 J monophasic	NA
	Internal defibrillation	5 J; increase to 10 if ineffective	NA
	Internal synchronized cardioversion	2 J; increase to 5 J if ineffective	NA

Abbreviations: mg, milligram; mcg, microgram; ng, nanogram; max, maximum; CPB, cardiopulmonary bypass; NA, not applicable; J, joules; meq, milliequivalents; IV, intravenous; IM, intramuscular; PO, oral.

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## Appendix 2: PEDIATRIC ANESTHESIA DRUGS AND OTHER TREATMENTS

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# Appendix 3:

## NORMAL LABORATORY VALUES

Dean B. Andropoulos, MD<sup>1</sup>, George A. Gregory, MD<sup>2</sup>

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Source: Texas Children's Hospital Clinical Laboratory, Houston, Texas

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Legends: (A) = Arterial (M) = Male

(B) = Blood (P) = Plasma

(C) = Capillary (S) = Serum

(CSF) = Cerebrospinal Fluid (SWT) = Sweat

(F) = Female (U) = Urine

(WB) = Whole Blood

For conversion of conventional (U.S.) units to SI units, see:

[http://www.soc-bdr.org/rds/authors/unit\\_tables\\_conversions\\_and\\_genetic\\_dictionaries/e5196/index\\_en.html](http://www.soc-bdr.org/rds/authors/unit_tables_conversions_and_genetic_dictionaries/e5196/index_en.html)

**All practitioners are urged to consult the normal laboratory values for their local laboratory, as these may differ from those listed below. They are also advised to continually check for updated normal ranges.**

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TEST	REFERENCE RANGE (United States Conventional Units)
<b>Albumin (CSF)</b>	10 – 30 mg/dL
<b>Albumin (S,P)</b> <u>Age</u> 0 – 30 days 1 – 3 mos 4 – 11 mos ≥ 1 yr	<u>g/dL</u> 2.9 – 5.5 2.8 – 5.0 3.9 – 5.1 3.7 – 5.5
<b>Albumin (Random Urine)</b>	≤ 37 mg/L or ≤ 3.7 mg/dL
<b>Albumin/Creatinine Ratio (Random Urine)</b>	≤ 16 mg/g
<b>Alanine Aminotransferase(S,P)</b> <u>Age</u> 0 – 11 mos 1 – 3 yrs 4 – 6 yrs 7 – 9 yrs  10 – 11 yrs 12 – 13 yrs 14 – 15 yrs 16 – 18 yrs ≥ 19 yrs	<u>M/F (U/L)</u> 6 – 50 6 – 45 10 – 25 10 – 35  <u>Male (U/L)</u> <u>Female (U/L)</u> 10 – 35      10 – 30 10 – 55      10 – 30 10 – 45      6 – 30 10 – 40      6 – 35 21 – 72      9 – 52
<b>Alkaline Phosphatase (S,P)</b> <u>Age</u> 0 – 5 days 6 days – 11 mos 1 – 3 yrs 4 – 6 yrs 7 – 9 yrs  10 – 11 yrs 12 – 13 yrs 14 – 15 yrs 16 – 18 yrs ≥ 19 yrs	<u>M/F (U/L)</u> 110 – 300 110 – 320 145 – 320 150 – 380 175 – 420  <u>Male (U/L)</u> <u>Female (U/L)</u> 135 – 530      130 – 560 200 – 495      105 – 420 130 – 525      70 – 230 65 – 260      50 – 130 38 – 126      38 – 126
<b>Ammonia (P)</b> <u>Age</u> 0 – 7 days 8 – 30 days 1 – 12 mos 1 – 15 yrs ≥ 16 yrs	<u>µmol/L</u> 54 – 94 47 – 80 15 – 47 22 – 48 9 – 26
<b>Amylase (S,P)</b>	30 – 115 U/L
<b>Antistreptolysin-O (ASO)</b>	< 250 IU/ml
<b>Antithrombin (ATIII)(P)</b> <b>Normal Ranges for healthy full-term infants</b> Day 1 Day 5 Day 30 Day 90 Day 180	85 – 130 %  63%      (39-87%) 67%      (41-93%) 78%      (48-108%) 97%      (73-121%) 104%      (84-124%)



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<p><b>Aspartate Aminotransferase (S,P)</b></p> <p><u>Age</u>            0 – 5 days            6 days – 3 yrs            4 – 6 yrs            7 – 9 yrs              10 – 11 yrs            12 – 15 yrs            16 – 18 yrs            ≥ 19 yrs</p>	<p><u>M/F (U/L)</u>            35 – 140            20 – 60            15 – 50            15 – 40</p> <p><u>Male (U/L)</u>      <u>Female (U/L)</u>            10 – 60              10 – 40            15 – 40              10 – 30            10 – 45              5 – 30            17 – 59              14 – 36</p>
<p><b>Bilirubin (S,P)</b></p> <p><u>Age</u>            Up to 23 hrs            24 – 48 hrs            3 – 5 days            ≥ 1 month            Bc Conjugated                Bu Unconjugated            Total</p>	<p><u>Premature</u>      <u>Full-Term</u>  <u>mg/dL</u>      <u>mg/dL</u>  <u>Total</u>      <u>Total</u>            1 – 8      2 – 6            6 – 12      6 – 10            10 – 14      4 – 8</p> <p><u>mg/dL</u>            &lt;0.35            &lt;1.0            0.2 – 1.0</p>
<p><b>Blood Gases</b></p> <p><u>pH</u></p> <p><u>Capillary/Arterial</u></p> <p><u>Age</u>            Newborn            1 day            2 – 30 days            1 mo            2 mos – 1 yr            ≥ 2 yrs</p> <p>    Male          Female</p> <p><u>Venous</u>            All ages</p>	<p>7.33 – 7.49            7.25 – 7.43            7.32 – 7.43            7.34 – 7.43            7.34 – 7.46</p> <p>7.35 – 7.45            7.36 – 7.44</p> <p>7.32 – 7.42</p>
<p><b>Blood Gases pCO<sub>2</sub></b></p> <p><u>Capillary/Arterial</u></p> <p><u>Age</u>            0 – 1 mo            2 mos – 1 yr            ≥ 2 yrs</p> <p>    Male          Female</p> <p><u>Venous</u>            All ages</p>	<p><u>mmHg</u>            27 – 40            26 – 41</p> <p>36 – 46            33 – 43</p> <p>40 – 50</p>
<p><b>Blood Gases pO<sub>2</sub></b></p> <p><u>Age</u>            0 – 1 yr            ≥ 2 yrs            Oxygen Saturation</p>	<p><u>mmHg</u>      <u>mmHg</u>      <u>mmHg</u>  <u>Capillary</u>      <u>Arterial</u>      <u>Venous</u>            60 – 70      65 – 76      25 - 40            80 – 90      88 – 105      40 - 47            85 – 100%</p>
<p><b>Ca<sup>++</sup> (Ionized) (WB)</b></p> <p><u>Age</u>            0 – 30 days            1 – 5 mos            ≥ 6 mos</p>	<p><u>mmol/L</u>            0.90 – 1.45            0.95 – 1.50            1.10 – 1.30</p>

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<b>Calcium (S - Total)</b>	
<u>Age</u>	<u>mg/dL</u>
0 – 11 mo	8.0 – 10.7
1 – 3 yrs	8.7 – 9.8
4 – 11 yrs	8.8 – 10.1
12 – 13 yrs	8.8 – 10.6
14 – 15 yrs	9.2 – 10.7
≥ 16 yrs	8.9 – 10.7
<b>Chloride (S,P)</b>	95 – 105 mmol/L
<b>Chloride (CSF)</b>	122 – 132 mmol/L
<b>Chloride (U) — Random</b>	No Reference Range
<b>CO<sub>2</sub> Content (S,P)</b>	
<u>Age</u>	<u>mmol/L</u>
0 – 15 yrs	20 – 28
≥ 16 yrs	25 – 35
<b>Cortisol (S)</b>	
<u>Age</u>	<u>µg/dL</u>
1 – 7 days	2 – 11
1 – 12 months	2.8 – 23
1 – 16 yrs (8 AM)	3 – 21
≥ 16 yrs(8 AM)	8 – 19
(4 PM)	4 – 11
<b>Creatine Kinase (CPK)(S,P)</b>	
<u>Age</u>	<u>M/F (U/L)</u>
0 – 3 YRS	60 – 305
4 – 6 yrs	75 – 230
7 – 9 yrs	60 – 365
	<u>Male (U/L)</u>
10 – 11 yrs	55 – 215
12 – 13 yrs	60 – 330
14 – 15 yrs	60 – 335
16 – 18 yrs	55 – 370
≥ 19 yrs	55 – 170
	<u>Female (U/L)</u>
	80 – 230
	50 – 295
	50 – 240
	45 – 230
	30 – 135
<b>Creatine Kinase MB band(S,P)</b>	Normal: <5 ng/mL Borderline: 5-10 ng/mL Abnormal: >10 ng/mL
<b>Creatinine Clearance (U)</b>	
<u>Age</u>	<u>mL/min</u>
0 – 30 days	25 – 55
1 – 5 mos	50 – 90
6 – 11 mos	75 – 125
≥ 1 yr	90 – 150
<b>D-Dimer (P)</b>	
Adult	≤ 0.40 µg/mL FEU
Neonatal Reference Range from Cord Blood	<3.40 µg/mL FEU
<b>Fibrinogen (P)</b>	
Adult	220 – 440 mg/dL
Neonatal Reference Range from Cord Blood	135 – 283 mg/dL
<b>Fibrin Split Product (FSP)(P)</b>	1:2 Dilution = Negative (<5 ug/mL)
<b>Gamma-Glutamyl Transferase (GGT)(S,P)</b>	
<u>Age</u>	<u>M/F (U/L)</u>
0 – 5 days	34 – 263
6 days – 2 mos	10 – 160
3 – 11 mos	11 – 82
1 – 3 yrs	10 – 19
4 – 6 yrs	10 – 22

**Anesthesia Care of Pediatric Patients (George A. Gregory & Dean B. Andropoulos)**

7 – 9 yrs	13 – 25	
10 – 11 yrs	<b>Male (U/L)</b> 17 – 30	<b>Female (U/L)</b> 17 – 28
12 – 13 yrs	17 – 44	14 – 25
14 – 15 yrs	12 – 33	14 – 26
16 – 18 yrs	11 – 34	11 – 28
≥ 19 yrs	10 – 78	10 – 78
<b>Glucose (S,P)(WB):</b> Glucose conversion factor for mg/dL to mmol/L: divide mg/dL value by 18		
<b>Age</b>	<b>mg/dL</b>	
1 – 12 hrs	40 – 65	
12 – 23 hrs	40 – 80	
1 day	50 – 58	
2 days	58 – 60	
≥ 3 days	70 – 110	
<b>Glucose (CSF)</b>	50 – 70% of serum glucose	
<b>Glucose (U) — Timed</b>	<500 mg/24 hrs	
<b>Glucose (U) — Random</b>	<30 mg/dL	
<b>Glycosylated Hemoglobin (WB)</b>	Non-diabetics 4.0 – 6.8% Diabetics 6.0 – 22.0%	
<b>Hematocrit (B)</b>		
<b>Age</b>	<b>%</b>	
0 – 30 days	44 – 70	
1 mo	32 – 42	
2 – 6 mos	29 – 41	
7 mos – 2 yrs	33 – 39	
3 – 6 yrs	34 – 40	
7 – 12 yrs	35 – 45	
13 – 18 yrs/Female	36 – 45	
13 – 18 yrs/Male	37 – 49	
≥ 19 yrs/Female	36 – 46	
≥ 19 yrs/Male	41 – 53	
<b>Hemoglobin (B)</b>		
<b>Age</b>	<b>g/dL</b>	
0 – 30 days	15.0 – 22.0	
1 mo	10.5 – 14.0	
2 – 6 mos	9.5 – 13.5	
7 mos – 2 yrs	10.5 – 14.0	
3 – 6 yrs	11.5 – 14.5	
7 – 12 yrs	11.5 – 15.5	
13 – 18 yrs/Female	12.0 – 16.0	
13 – 18 yrs/Male	13.0 – 16.0	
≥ 19 yrs/Female	12.0 – 16.0	
≥ 19 yrs/Male	13.5 – 17.5	
<b>International Normalized Ratio (INR) (P)</b>		
Adult	0.8 – 1.2	
Neonatal Reference Range from Cord Blood	1.0 – 1.4	
<b>Lactate (P,WB,CSF)</b>		
	<b>Mmol/L</b>	
Plasma (venous)	0.2 – 2.0	
Plasma (arterial)	0.3– 0.8	
CSF	0.6 – 2.2	
Whole Blood	0.2 – 1.7	
<b>Lactate Dehydrogenase (LDH) (S,P)</b>		
<b>Age</b>	<b>M/F (U/L)</b>	
0 – 5 days	934 – 2150	
6 days – 3 yrs	500 – 920	

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4 – 6 yrs	470 – 900	
7 – 9 yrs	420 – 750	
	<b>Male (U/L)</b>	<b>Female (U/L)</b>
10 – 11 yrs	432 – 700	380 – 770
12 – 13 yrs	470 – 750	380 – 640
14 – 15 yrs	360 – 730	390 – 580
16 – 18 yrs	340 – 670	340 – 670
≥ 19 yrs	313 – 618	313 – 618
<b>LDH (CSF)</b>		
<b>Age</b>		
0 – 30 days	2.3 – 8.4 U/L	
≥ 1 mo	Approximately 10% of serum value	
<b>Lipase (S,P)</b>		
<b>Age</b>	<b>U/L</b>	
0 – 9 yrs	25 – 120	
10 – 13 yrs	15 – 110	
14 – 18 yrs	25 – 110	
≥ 19 yrs	23 – 300	
<b>Magnesium (S,P)</b>		
<b>Age</b>	<b>mg/dL</b>	
0 – 6 days	1.2 – 2.6	
7 – 30 days	1.6 – 2.4	
1 mo – 1 yr	1.6 – 2.6	
2 – 5 yrs	1.5 – 2.4	
6 – 9 yrs	1.6 – 2.3	
10 – 13 yrs	1.6 – 2.2	
≥ 14 yrs	1.5 – 2.3	
<b>Methemoglobin (WB)</b>	<2% of tHb	
<b>Osmolality (S,P)</b>	275 – 295 mOsm/kg H <sub>2</sub> O	
<b>Osmolality (U)</b>	300 – 1000 mOsm/kg H <sub>2</sub> O	
<b>Phosphorus, Inorganic (S,P)</b>		
<b>Age</b>	<b>mg/dL</b>	
Premature	5.6 – 8.0	
Term	5.0 – 7.8	
0 – 3 mos	4.8 – 8.1	
4 – 11 mos	3.8 – 6.7	
1 – 4 yrs	3.5 – 6.8	
5 – 7 yrs	3.1 – 6.3	
8 – 11 yrs	3.0 – 6.0	
12 – 16 yrs	2.5 – 5.0	
≥ 17 yrs	2.3 – 4.8	
<b>Plasma Hemoglobin (P)</b>	≤4 mg/dL	
<b>Platelet Count (B)</b>	150,000 – 450,000 μL	
<b>Potassium (S,P)</b>		
<b>Age</b>	<b>mmol/L</b>	
0 – 30 days	4.5 – 7.0 (venous or arterial)	
	4.5 – 7.5 (heel stick)	
1 – 2 mos	4.0 – 6.2	
3 – 11 mos	3.7 – 5.6	
≥ 1 yr	3.5 – 5.5	
<b>Potassium (WB)</b>		
<b>Age</b>	<b>mmol/L</b>	
Premature	4.5 – 7.0	
0 - 11 mos	5.0 – 5.7	
≥ 1 yr	3.5 – 5.5	
<b>Protein, Total (S,P)</b>		

**Anesthesia Care of Pediatric Patients (George A. Gregory & Dean B. Andropoulos)**

<b>Age</b> 0 – 30 days 1 – 3 mos 4 – 11 mos ≥ 1 yr	<b>g/dL</b> 4.4 – 7.6 4.2 – 7.4 5.6 – 7.2 6.0 – 8.0
<b>Protein (CSF)</b> <b>Age</b> Premature 0 – 30 days ≥ 1 mo	<b>mg/dL</b> 40 – 300 <100 15 – 45
<b>Prothrombin Time (PT)(P)</b> Adult Neonatal Reference Range from Cord Blood	12.2 – 15.5 seconds 12.9 – 16.9 seconds
<b>Partial Thromboplastin Time (PTT) (P)</b> Adult Neonatal Reference Range from Cord Blood	26.5 – 35.5 seconds 28.7 – 53.7 seconds
<b>Red Blood Cell Count (RBC) (B)</b> <b>Age</b> 0 – 30 days 1 mo 2 – 6 mos 7 mos – 2 yrs 3 – 6 yrs 7 – 12 yrs 13 – 18 yrs /Female 13 – 18 yrs /Male ≥ 19 yrs/Female ≥ 19 yrs/Male	<b>×10<sup>6</sup>/μL</b> 4.1 – 6.7 3.0 – 5.4 2.7 – 4.5 3.7 – 5.3 3.9 – 5.3 4.0 – 5.2 4.1 – 5.1 4.5 – 5.3 4.2 – 5.4 4.7 – 6.0
<b>Reticulocyte Count % (B)</b> <b>Age</b> 0 – 2 days 3 – 4 days > 4 days	<b>%</b> 3.0 – 7.0 1.0 – 3.0 0.5 – 1.5
<b>Reticulocyte Count Absolute (B)</b> <b>Age</b> 0 – 2 days 3 – 4 days > 4 days	<b>×10<sup>6</sup>/μL</b> 0.140 – 0.220 0.040 – 0.110 0.020 – 0.080
<b>Sedimentation Rate (B)</b>	0 – 20 mm/hr
<b>Sodium (S,P) (WB)</b> <b>Age</b> Premature 0 – 11 mos ≥ 1 yr	<b>mmol/L</b> 132 – 140 133 – 142 136 – 145
<b>Sodium (U) — Random</b>	No Normals
<b>Thromboelastogram (TEG )with Kaolin</b> Reaction Time Angle Max Amplitude Fibrinolysis Clot Strength	4.4 – 11.0 minutes 49.1 – 74.7 degrees 53.6 – 70.3 mm 0.0 – 7.5% 5.2 – 11.3
<b>Thrombin Time</b>	15.0 – 19.0 seconds
<b>Triglycerides (S,P)</b>	20 – 150 mg/dL
<b>Troponin I (S,P)</b>	<0.15 ng/mL
<b>Urea Nitrogen (S,P)</b> <b>Age</b> 0 – 1 yr	<b>mg/dL</b> 8 – 28

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2 – 15 yrs ≥ 16 yrs	5 – 25 5 – 20
<b>Uric Acid (S,P)</b>	2.0 – 6.2 mg/dL
<b>Urinalysis (U)</b>	
Specific Gravity	1.001 – 1.035
PH	4 – 9
Protein	Neg
Glucose	Neg
Ketone	Neg
Bilirubin	Neg
Urobilinogen	< 2.0
WBC	0 – 4 / HPF
RBC	0 – 4 / HPF
EPI (Epithelial cells)	0 – 4 / LPF
<b>White Blood Cell Count (WBC) (B)</b>	
<u>Age</u>	<u>x10<sup>3</sup>/μL</u>
0 – 30 days	9.1 – 34.0
1 month	5.0 – 19.5
2 – 11 mos	6.0 – 17.5
1 – 6 yrs	5.0 – 14.5
7 – 12 yrs	5.0 – 14.5
13 – 18 yrs	4.5 – 13.5
≥ 19 yrs	4.5 – 11.0
<u>Age</u>	<u>Seg% Band% Lymphs% Monos%</u>
	<u>EOS% BASO% ANC</u>
0 – 30 days	32-67 0-8 25-37 0-9 0-2 0-1 6.0-23.5
1 month	20-46 0-4.5 28-84 0-7 0-3 0-1 1.0-9.0
2 – 11 mos	20-48 0-3.8 34-88 0-5 0-3 0-1 1.0-8.5
1 – 6 yrs	37-71 0-1.0 17-67 0-5 0-3 0-1 1.5-8.0
7 – 12 yrs	33-76 0-1.0 15-61 0-5 0-3 0-1 1.5-8.0
13 – 18 yrs	33-76 0.1.0 15-55 0-4 0-3 0-1 1.8-8.0
≥ 19 yrs	33-76 0-0.7 14-54 0-4 0-3 0-1 1.8-7.7

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