

Pediatric Anaesthesia – Pocket Guide

NORMAL VALUES:

Age:	1-3 months	1 year	3 years	5 years	7 years	9 years	12 years	14 years
Weight:	5 kg	10 kg	15 kg	20 kg	25 kg	30 kg	40 kg	50 kg
Length (cm):	55-60	75	95	110	120	135	150	160
RR (/min):	30-60	20-30	20-30	18-25	18-20	15-20	12-20	12-16
Tidal volume:	30-40	60-80	90-120	120-160	150-200	180-240	240-320	300-400
Pulse:	110-160	90-120	80-120	70-110	60-90	60-80	60-80	60-80
Syst BP:	70-95	80-100	80-110	80-110	80-115	90-120	90-120	90-120
Laryngoscope	0	1		2			3	
ETT (cuff):	3	3.5	4	4.5	5	5.5	6	7
LMA size	1	1.5	2		2.5		3	4

Uncuffed tube size > 2 years ≈ (Age/4); Cuffed tube = 0.5 mm small
 Tube depth for children < 1 year: Oral = kg/2 + 8 Nasal = kg/2 + 9
 Tube depth for children > 1 year: Oral = year/2 + 12 Nasal = year/2 + 14
 LMA for children < 1 year should only be used by a pediatric anesthetist (however, always an alternative for severe mask ventilation regardless)

Normal MAP: 1.5 x year + 55 mmHg
 MAP limit anesthesia (mmHg):
 Newborn MAP > gestational age < 1 year MAP > 45 (weeks)
 1-5 years MAP > 50
 > 5 years MAP > 50-60

Fasting rules:
 - Fast food 6h
 - Breast milk 4h
 - Clear liquid 2h

Premedication

Midazolam (Approx. 20 min - t_{1/2}) po 0.5 mg/kg (max 15 mg) rectally 0.3 mg/kg
 (Atropine mixture for small children)
 Ketamine combine with midazolam po 5 mg/kg (max 300 mg)
 Clonidine (Approx. 90 min - t_{1/2} 5-10 h) at 2.5 µg/kg
 Dexmedetomidine (Approx. 30-60 min - t_{1/2} 2 h) nasally 2-4 µg/kg
 Sufentanil (Approx. 10-15 min) nasally 1-2 µg/kg
 EMLA (Medical patch 25 mg lidocaine/25 mg prilocaine)
 0-3 months 1 pc-1 h, no longer!
 3-12 months 1-2 pcs 1 h
 > 1 year 1 or several sts 1-1.5 h
 Rapydin (70 mg lidocaine/70 mg tetracaine)
 Children > 3 years 1-2 pcs (max 2/day) 30 min to maximum effect

Opioids

Fentanyl Induction: iv 2 µg/kg (50 µg/ml = 0.04 ml/kg)
 Alfentanil Induction: iv 10-20 µg/kg
 Maintenance TIVA: 30 µg/kg/h
 Morphine Bolus: < 3 months: iv 30-50 µg/kg
 3-12 months: iv 50-100 µg/kg
 > 12 months: iv 100-300 µg/kg
 Infusion iv: 5-30 µg/kg/h
 Remifentanyl Induction with relax: iv 1-3 µg/kg
 Intub without relaxation (> 6 months): iv 4 µg/kg
 Maintenance TIVA: 0.25-1 µg/kg/min
 Non-intubated child: iv 0.2-0.3 µg/kg
 Naloxon (400 µg/ml -10 kg ≈ 0,075 ml) iv 2-4 (-10) µg/kg

Induction

Propofol (10 mg/ml = 0.3-0.6 ml/kg) iv 3-6 mg/kg
 infusion 15-12-9-6 mg/kg/h (lower every 10th min)
 Ketamine (10 mg/ml = 0.2 ml/kg) iv 2 mg/kg
 infusion 5-10 mg/kg
 Thiopentone (Thiopental) (25 mg/ml = 0.2 ml/kg) iv 5 mg/kg
 Atropine (0.5 mg/ml = 0.02 ml/kg) iv 10 µg/kg (max 0.5 mg)
 Glycopyrrone (0.2 mg/ml = 0.025 ml/kg) iv 5 µg/kg (max 0.2 mg)
 Anticholinergics are given on indication!

Sevoflurane Mac: Newborn: 3.3% 6 months: 3% 12 years: 2.5%

Antiemetics:

PONV risk: > 3 years of age, long anesthesia, eye/EENT surgery, motion sickness, time PONV
 Prophylaxis: Propofol induction - Evacuate air from ventricle - Keep pat well oxygenated
 Ondansetron iv 0.1 mg/kg (max 4 mg)
 Betametason iv 0.2 mg/kg (max 4 mg) (cortisone)
 Droperidol (not for children < 2 years) iv 0.02 mg/kg (max 1.25 mg)

Muscle relaxants:

Suxamethonium (50 mg/ml = 0.03 ml/kg) iv 1-2 mg/kg
 (always give atropine = histamine release may cause bronchospasm)
 Rocuronium (10 mg/ml = 0.06 ml/kg) iv 0.6 mg/kg
 Robinul-Neostigmine® (2.5 mg/ml) iv 0.02 ml/kg (max 2.5 mg)
 For TOF measurement: Adjust down current to 25 mA on children under 2 years

Peripheral analgesics

Ketorolac Toradol® (not < 3-6 months, COX 1 + 2) iv 0.3 mg/kg x 4
 Parecoxib Dynastat® (not < 3-6 months COX 2) iv 0.5 mg/kg x 1
 Ibuprofen (not < 3 months COX 1 + 2) po 7.5 mg q 3-4
 Paracetamol po 15 mg/kg x 4 (first 3 days 20-25 mg/kg x 4)
 iv 15 mg/kg x 4 (use iv ffa first post-day) reduce dose to children < 3 months

LA - max doses: Lidocaine: 5 mg/kg (+ adrenaline: 7 mg/kg)
 Ropivacaine: 2-3 mg/kg Mepivacaine: 5 mg/kg
 Bupivacaine 2 mg/kg Levobupivacaine: 2 mg/kg EDA: (1-12 years)
 (applies to children > 3 months based on ideal weight)
 Spinal: Marcain spinal®: 0.3-0.4 mg/kg
 Sacral: Ropivacaine 1-2 mg/kg
 Ropivacaine Bolus: 2 mg/kg
 Infusion 0.4-1 mg/kg/h

Fluid therapy

BASIC NEED (4/2/1-rule)
 0-10 kg → 4 ml/kg/h ; 10-20 kg → 40 ml+2 ml/kg/h in weight >10 kg >20 kg → 60 ml+1 ml/kg/h for weight > 20 kg

PEROP FLUID NEED (Ringer-Acetate = standard)
 • Children < 10 kg: 10 ml/kg first 1-2 hours
 • Children > 10 kg: 3-5 ml/kg first 1-2 hours
 Then 1-2 ml/kg/h + measured/estimated losses
 3:e room losses: 1-10 ml/kg/h depending on type of surgery

Bolus dose volume: Ringer-Lactate / Albumine 5% / Blood → 5 - 10 - 20 ml/kg

Glucose admin perop:
 - Glc 10% + 40 Na/20 K
 - 3 ml/kg → adjust by b-glucose!
 Indications
 • Child < 1 week • Ongoing glc-inf preop
 • Metabolic disease • Underweight newborn
 Blood volume: 70-90 ml/kg
 Blood is replaced with plasma
 (if blood volume is not replaced
 use 5% Ringer-Lactate (or sim)
 20-30 ml/kg
 20-30 ml/kg
 20-30 ml/kg

POST OP FLUID NEED - Give 75% of 4/2/1-rule 1:st op day (due to increased ADH)

• Ringer-Lactate • Glucose 10% + 120 Na/ 20 K (Reduce electrolytes for children < 6 months)
 Urine production (ml/kg/h): <2 years: 1,5-2 ; 3-5 years: 1-1,5 6-12 years: 0,5-1
 Bladder capacity: Children < 12 years = age x 30 ml + 30 ml Children > 12 years 350-500 ml
 Cath size: < 1 size: 6 fr 1-6 years: 8 fr 8-12 years: 10-12 fr 13-16 years: 10-14 fr
 Artery < 6 months- 0.7 mm (yellow) CVL < 10 kg 3.5 fr 4-6 cm
 > 6 months- 0.9 mm (blue) CVL 10-30 kg 5-6 fr 6-10 cm
 size: > 25 kg - adult size size: > 30 kg 7 fr 10-15 cm
 CVL depth from IJV dx (cm): 1.7+(0.07x body length in cm)

Massive bleeding:
 Adjust with tromboelastogram!
 Without tromboelastogram:
 Blood: Plasma: Platelets: 1-1.1: 0.5
 Coagulation:
 + Platelets 5-10 mg/kg
 + Fibrinogen 30-70 mg/kg
 + Tranex. acid 15 mg/kg
 OBS: - temp > 36.5°C - pH > 7.2
 - follow s-Ca - Hgb > 9.0

Vasopressor/inotropy

Calcium glucon. 10 ml=2.25 mmol Ca iv 0.25-0.5 ml/kg
 Phenyephreline 100 µg/ml iv 1-5 µg/kg
 Ephedrine 50 mg/ml → dilute to 5 mg/ml iv 0.1 µg/kg
 Norepinephrine 20 µg/ml - in a CVL inf 0,05-0,5 µg/kg/min
 Epinephrine 0.1 mg/ml Δ bolus iv 1-10 µg/kg
 20 µg/ml - in a CVL inf 0,01-0,5 µg/kg/min

Inhalation - dilute with NaCl to 2 ml

Decongestant + bronchodilation:
 Epinephrine 1 mg/ml < 2 years: 1 mg ≥ 2 years: 2 mg
 Raccipinephrine 22.5 mg/ml 0.4 mg/kg
 (No benefit compared to adrenaline - dosed in double dose compared to adrenaline)
 Bronchodilation:
 Salbutamol 5 or 1 mg/ml 0.15 mg/kg x 4-6 max 5 mg/dos
 Ipratropium 0.25 mg/ml < 12 years: 0.25 mg ≥ 12 years: 0.5 mg

Laryngospasm

Risk factors:
 URTI: fever, productive cough, colored sring
 Asthma < 2 weeks away
 Low age < 2 weeks away
 ENT surgery
 Respiratory manipulation
 Prophylaxis:
 IV induction
 Raccipinephrine, nezeril, robinul
 Extubation side position
 Small propofol doses before waking
 Lidocaine iv 1mg / kg

IV access:
 Propofol 0.5-3.0 mg/kg
 Suxamethon 0.25-2 mg/kg
 + Atropin 10 µg/kg in high dose
 No IV access:
 Think introsseous needle in Suxamethonium 4 mg/kg
 - Remove stimuli (blood, mucus, pain)
 Jaw lift, PEEP, 100% O₂
 - Call a colleague
 - Mask ventilation + PEEP
 - Intubation
 ENT CPR

DRUGS DURING CPR

In case of asystole/bradycardia/PEA
 - Adrenaline 0.01 mg/kg immediately
 Repeat every 4th min
 At VF/pulseless VT
 - Adrenaline 0.01 mg/kg after 3 def.
 Repeat every 4th min
 - Amiodarone 5 mg/kg after 3 def.
 Repeat after 5 def.

CPR CHILDREN

Children < 1 year 1 year to puberty
 Give 5 breaths
 15 compressions: 2 breaths
 Ventilate with 100% O₂
 Adrenaline 0.01 mg/kg
 Amiodarone 5 mg/kg
 Glucose 10% 2 ml/kg
 Ringer's acetate 20 ml/kg
 Trilonate (0.5 mmol/ml) 2 ml/kg
 Correct causes:

