

# A Guide to Pediatric Anesthesia

Craig Sims  
Dana Weber  
Chris Johnson  
*Editors*

*Second Edition*

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Springer

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## Ten Current Issues in Pediatric Anesthesia and Where to Find Them

### 1. **Emergence Delirium**

Young children sometimes wake from anesthesia crying and unhappy. There are many reasons for this, although sevoflurane dysphoria is commonly blamed. See Chap. 2.

### 2. **The Uncooperative Child**

Many children become anxious during induction of anesthesia, and their anxiety may cause them to become uncooperative. There are many ways to reduce children's anxiety. See Chap. 3.

### 3. **Videolaryngoscopes**

Many types of videolaryngoscopes are now available in sizes suitable for children. Their use is being informed by new studies, including the PediRegistry study of difficult airway management in children. See Chap. 4.

### 4. **Reducing Perioperative Respiratory Complications**

Respiratory complications are the leading cause of morbidity in pediatric anesthesia, and there has been a surge in studies looking at the risk factors for them and how to modify the risk. See Chap. 11.

### 5. **Shorter Fasting Times for Clear Fluids**

It is now realized clear fluids leave the stomach quickly, and allowing them up to 1 h or less before anesthesia has become common. See Chap. 5.

### 6. **Neurotoxicity of Anesthetic Agents**

There is laboratory evidence that many anesthetic agents, including volatiles, affect the developing brain of neonates. See Chap. 2.

### 7. **The Airway**

Many anesthesiologists do not like caring for children because of difficulties managing the pediatric airway. See Chap. 4 for many practical tips.

### 8. **RSI and Cricoid Pressure**

The adult technique of rapid sequence induction is dangerous if directly applied to young children. There are calls to abandon the technique and cricoid pressure altogether. See Chap. 1.

**9. Reducing Pain and Distress During Procedures**

Holding a child down to perform a procedure is becoming less and less acceptable. Many techniques and drugs are now used to make procedures more comfortable and less distressing for the child, parents, and staff. See Chap. [27](#).

**10. Hypotonic IV Fluids for Children**

Hypotonic, dextrose-containing solutions have been traditionally used for IV fluids in children. The risk of hyponatremia from these fluids is so high that salt-rich fluids are recommended nowadays. See Chap. [5](#).

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## Useful Formulae in Pediatric Anesthesia

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### Weight

Body weight for infants =  $(\text{age in months}/2) + 4$  kg (APLS)

Body weight for children 1–10 years =  $(\text{age} + 4) \times 2$  kg (UK Resuscitation Council)

Body weight for children older than 10 years =  $\text{age} \times 3.3$  kg (large variation in normal adolescent weight however) (APLS)

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### Blood Pressure

Expected systolic blood pressure for children older than 1 year =  $80 + (\text{age in years} \times 2)$  mmHg.

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### Fluids

Maintenance fluid rate in mL/h: (4:2:1 rule)

4 mL/kg first 10 kg weight + 2 mL/kg next 10 kg weight + 1 mL/kg for rest of weight (e.g., for a 19 kg child:  $(10 \times 4) + (9 \times 2) = 58$  mL/h).

Minimum 10% dextrose infusion for neonate day one (4 mg/kg/min) in mL/h =  $2.5 \times \text{weight in kg}$  (e.g., 3 kg neonate needs at least 7.5 mL/h 10% dextrose)

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### ETT Size

Uncuffed ETT size for a child over 2 years:  $\text{Age}/4 + 4 = \text{ETT size}$  (inside diameter, mm) (modified Cole formula)

Cuffed ETT size for a child over 2 years:  $\text{Age}/4 + 3.5 = \text{ETT size}$  (ID, mm) (Motoyama formula)

## ETT Depth

Position at vocal cords = ID size of ETT (e.g., 4.5 ETT should be 4.5 cm at vocal cords)

Oral ETT length (at lips in cm) =  $\text{age}/2 + 12$

Nasal ETT length (at nostril in cm) =  $\text{age}/2 + 15$  (and diameter of correct-size nasal ETT same as oral ETT for children)

Neonates: Oral ETT length (at lips in cm) =  $\text{weight}(\text{kg}) + 6$

Neonates: Nasal ETT length (at lips in cm) =  $(\text{weight}(\text{kg}) \times 1.5) + 7$

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## Suction Catheter for ETT

Size of suction catheter for ETT (in French Gauge) =  $2 \times \text{size of ETT (ID)}$

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## Urinary Catheter

Urinary catheter size (FG) =  $2 \times \text{size of ETT (ID)}$

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## CVC

Depth for central line placement in right IJV = 10% of height (e.g., 8 cm in an 80 cm long child)



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# Contents

<b>1</b>	<b>An Overview of Pediatric Anesthesia</b> . . . . .	<b>1</b>
	Craig Sims and Tanya Farrell	
<b>2</b>	<b>Pharmacology of Anesthetic Agents in Children</b> . . . . .	<b>27</b>
	Craig Sims and John Thompson	
<b>3</b>	<b>Behavioral Management of Children</b> . . . . .	<b>55</b>
	Craig Sims and Lisa Khoo	
<b>4</b>	<b>Airway Management in Children</b> . . . . .	<b>77</b>
	Britta von Ungern-Sternberg and Craig Sims	
<b>5</b>	<b>Fluid Management in Children Undergoing Surgery and Anesthesia</b> . . . . .	<b>115</b>
	Ric Bergesio and Marlene Johnson	
<b>6</b>	<b>Equipment and Monitoring for Pediatric Anesthesia</b> . . . . .	<b>135</b>
	Craig Sims and Tom Flett	
<b>7</b>	<b>Resuscitation and Emergency Drugs</b> . . . . .	<b>155</b>
	Philip Russell	
<b>8</b>	<b>Crises and Other Scenarios in Pediatric Anesthesia</b> . . . . .	<b>181</b>
	Tom Rawlings and Tom Flett	
<b>9</b>	<b>Acute Pain Management in Children</b> . . . . .	<b>199</b>
	Priya Thalayasingam and Dana Weber	
<b>10</b>	<b>Regional Anesthesia for Infants and Children</b> . . . . .	<b>221</b>
	Chris Johnson and Chris Gibson	
<b>11</b>	<b>Respiratory Illnesses and Their Influence on Anesthesia in Children</b> . . . . .	<b>241</b>
	Britta von Ungern-Sternberg and David Sommerfield	
<b>12</b>	<b>Chronic Disease of Childhood</b> . . . . .	<b>259</b>
	Alison Carlyle and Soo-Im Lim	

<b>13</b>	<b>Congenital Syndromes and Conditions</b> . . . . .	281
	Prani Shrivastava and Dana Weber	
<b>14</b>	<b>Neonatal Anesthesia</b> . . . . .	287
	Chris Johnson and Dan Durack	
<b>15</b>	<b>Anesthesia for Pediatric General Surgery</b> . . . . .	315
	Claudia Rebmann	
<b>16</b>	<b>Anesthesia for Ear, Nose and Throat Surgery in Children</b> . . . . .	335
	Ian Forsyth and Rohan Mahendran	
<b>17</b>	<b>Bronchoscopy and Removal of Foreign Bodies from the Trachea</b> . . . . .	351
	Marlene Johnson and Craig Sims	
<b>18</b>	<b>Anesthesia for Dental Procedures in Children</b> . . . . .	365
	Lisa Khoo	
<b>19</b>	<b>Anesthesia for Orthopedic Surgery in Children</b> . . . . .	373
	Martyn Lethbridge and Erik Anderson	
<b>20</b>	<b>Congenital Heart Disease</b> . . . . .	381
	Serge Kaplanian	
<b>21</b>	<b>Anesthesia for Thoracic Surgery in Children</b> . . . . .	397
	Neil Chambers and Siva Subramaniam	
<b>22</b>	<b>Anesthesia for Plastic Surgery in Children</b> . . . . .	405
	Rohan Mahendran	
<b>23</b>	<b>Pediatric Neuroanesthesia</b> . . . . .	411
	Mairead Heaney	
<b>24</b>	<b>Anesthesia for Ophthalmic Surgery</b> . . . . .	421
	Elaine Christiansen	
<b>25</b>	<b>Trauma and Burns</b> . . . . .	427
	Mary Hegarty	
<b>26</b>	<b>Malignancy and Treatment of Malignancies in Children</b> . . . . .	443
	Bruce Hullett	
<b>27</b>	<b>Procedural Sedation: Anesthesia and Sedation of Children Away from the OR</b> . . . . .	453
	Tanya Farrell	
<b>28</b>	<b>Central Venous and Arterial Access for Children</b> . . . . .	465
	Neil Chambers and Yu-Ping Chen	
<b>29</b>	<b>The Child at Risk: Child Protection and the Anesthetist</b> . . . . .	475
	Craig Sims and Dana Weber	

---

<b>30</b>	<b>Pediatric Intensive Care</b> . . . . .	<b>479</b>
	Daniel Alexander	
<b>31</b>	<b>A Selection of Clinical Scenarios</b> . . . . .	<b>493</b>
	Dana Weber and Craig Sims	
<b>32</b>	<b>Glossary of Syndromes and Diseases</b> . . . . .	<b>503</b>
	Charlotte Jorgensen	
<b>33</b>	<b>Short-Answer Questions from Past FANZCA and FRCA Examinations</b> . . . . .	<b>515</b>
	Craig Sims	
	<b>Index</b> . . . . .	<b>521</b>