Advanced Life Support Group
A charity dedicated to saving life by providing training

APLS 7e manual updates – updated 14/03/2024

The following are changes made following publication of the APLS 7e manual. Some of these may be incorporated in reprints, but a full list is included here for completeness.

Date	Reprint updates after first publication of 7e
n/a	n/a

Chapter	Dates of changes noted below
Inside cover	December 2023
Chapter 1 – Introduction and structured approach to paediatric emergencies	
Chapter 2 - Getting it right – non-technical factors and communication	November 2023
Chapter 3 – Structured approach to the seriously ill child	November 2023
Chapter 4 – Airway and Breathing	November 2023
Chapter 5 – Circulation	
Chapter 6 – Decreased conscious level (with or without seizures)	November 2023
Chapter 7 – Exposure	November 2023
Chapter 8 – Structured approach to the seriously injured child	February 2023
Chapter 9 – The child with chest injury	November 2023
Chapter 10 – The child with abdominal injury	
Chapter 11 – The child with traumatic brain injury	
Chapter 12 – The child with injuries to extremities or spine	
Chapter 13 – The burned or scalded child	
Chapter 14 – The child with an electrical injury	
Chapter 15 – Special considerations	
Chapter 16 – Basic Life Support	November 2023
Chapter 17 – Support of the airway and ventilation	October 2023, November 2023
Chapter 18 – Management of cardiac arrest	November 2023, January 2024
Chapter 19 – Practical Procedures: airway and breathing	December 2023
Chapter 20 - Practical Procedures: circulation	August 2023, November 2023, January 2024
Chapter 21- Practical Procedures: trauma	
Chapter 22 – Imaging in trauma	November 2023, December 2023, January 2024
Chapter 23 – Structured approach to stabilisation and transfer	November 2023
Appendix A – Acid-base balance and blood gas interpretation	
Appendix B – Fluid and electrolyte management	
Appendix C – Paediatric major trauma	January 2024
Appendix D – Safeguarding	
Appendix E – Advance decisions and end of life	
Appendix F – General approach to poisoning and envenomation	
Appendix G – Resuscitation of the baby at birth	
Appendix H – Drowning	November 2023, December 2023
Appendix I – Point of care ultrasound	
Appendix J - Formulary	November 2023, December 2023, February 2024, March 2024

Inside front cover

<table>
<tr><th>Page</th><th>Change</th><th>Date</th></tr>
<tr><td>Inside front cover</td><td>Aide memoire – click here for the full document
Change fluid cap from 250 ml to 500 ml in fluid column.
Replacement of fluid bolus volume from 250ml to 10 ml/kg for ages 9 - 14 yr.

<table>
<tr><th>Age</th><th>Guide weight (kg)</th><th>Fluid 10 ml/kg (ml)</th></tr>
<tr><td>8 years</td><td>24</td><td>240</td></tr>
<tr><td>9 years</td><td>28</td><td>280</td></tr>
<tr><td>10 years</td><td>30</td><td>300</td></tr>
<tr><td>11 Years</td><td>35</td><td>350</td></tr>
<tr><td>12 years</td><td>40</td><td>400</td></tr>
<tr><td>14 years</td><td>50</td><td>500</td></tr>
<tr><td>Adult</td><td>70</td><td>500</td></tr>
</table>

Change ET tube to Cuffed ET tube and change of all sizes for all ages.

<table>
<tr><th rowspan="2">Age</th><th>Cuffed ET tube</th></tr>
<tr><th>Int diameter (mm)</th></tr>
<tr><td>Birth</td><td>3.0 (or uncuffed 2.5-3.0)</td></tr>
<tr><td>1 month</td><td>3.0</td></tr>
<tr><td>3 months</td><td>3.0</td></tr>
<tr><td>6 months</td><td>3.5</td></tr>
<tr><td>12 months</td><td>3.5</td></tr>
<tr><td>2 years</td><td>4.0</td></tr>
<tr><td>3 years</td><td>4.0</td></tr>
<tr><td>4 years</td><td>4.5</td></tr>
<tr><td>5 years</td><td>4.5</td></tr>
<tr><td>6 years</td><td>5.0</td></tr>
<tr><td>7 years</td><td>5.0</td></tr>
<tr><td>8 years</td><td>5.5</td></tr>
<tr><td>9 years</td><td>5.5</td></tr>
<tr><td>10 years</td><td>6.0</td></tr>
<tr><td>11 Years</td><td>6.0</td></tr>
<tr><td>12 years</td><td>6.5</td></tr>
<tr><td>14 years</td><td>7.0</td></tr>
<tr><td>Adult</td><td>8.0</td></tr>
</table>
</td><td>December 2023</td></tr>
</table>

Chapter 2 – Getting it right: non-technical factors and communication

Page	Change	Date
19	Addition of Human Factors Clinical Working Group to the end of the section 2.2 – (website www.chfg.org)	November 2023
22	Update to text in shaded box Team leader (Liz): *'Michael, can you please connect the ECG, and let me know when you've done it'* Michael: *'Okay, you'd like me to connect the ECG now?'* Team leader: *'Correct'* The loop is finally closed when Michael confirms that the specific allocated task has been done: Michael (later); *'Liz, the ECG is now connected'* Team leader: *'Noted Michael - thanks'*	November 2023

Chapter 3 – Structured approach to the seriously ill child

Page	Change	Date
33	New text to replace text underneath Resuscitation: The airway can be made patent by head tilt/jaw thrust or an airway adjunct but only tracheal intubation or tracheostomy protects/secures the airway.	November 2023
39	First heading to change to separate out Airway and Breathing, with the introduction of new Airway text. ***Airway*** • Patent or obstructed • Additional noises	November 2023

Chapter 4 – Airway and Breathing

Page	Change	Date
51	Change to must in place of should in red box sentence Disturbance of the child, and particularly attempts to lie the child down, examine the throat with a tongue depressor or insertion of an intravenous cannula must only be considered in the presence of appropriate senior support.	November 2023

Chapter 6 – Decreased conscious level (with or without seizures)

Page	Change	Date
111	Maximum dose of IV Midazolam should be 10 mg not 10 g. Correction to second bullet point in Five minutes from seizure onset (max. 10 mg) Correction to second bullet point in Five minutes after first dose of benzodiazepine (max. 10 mg)	November 2023

Chapter 7 – Exposure

Page	Change	Date
121	Changing amount and strength of lidocaine in second sentence. "A buffered solution (i.e. 10 ml of 1% lidocaine with 1 ml of 8.4% sodium bicarbonate)".	November 2023

Chapter 8 – Structured approach to the seriously injured child

Page	Change	Date
139	Correction of text to second bullet in the final row in Paediatric major trauma table to change the dose from 0.2 to 0.5ml/kg: C | Calcium gluconate | • Maintain ionised calcium more than 1.0 mmol/litre • Administer 0.5 ml/kg 10% calcium gluconate over 10 minutes as required • Give calcium routinely after MHP pack one	February 2023

Chapter 9 – The child with a chest injury

Page	Change	Date
153	Correction of text to thoracotomy NOT thoracostomy: If personnel are not available to carry out an emergency thoracotomy	November 2023

Chapter 16 – Basic Life Support

Page	Change	Date
212	Revision of text in airway section, with addition of text in bold: "If a child is not breathing, it may be because the airway has been blocked by the tongue falling back and obstructing the pharynx. Correction of the obstruction can result in rapid recovery without further intervention. An initial attempt to open the	November 2023

	airway should be made using the head tilt/chin lift manoeuvre. The rescuer places the hand nearest to the child's head on the forehead and applies pressure to tilt the head back gently. The fingers of the other hand should be placed under the chin and the chin should be lifted upwards in an attempt to lift the tongue base away from the posterior pharynx, thus improving airway patency. **Care should be taken not to potentially cause further obstruction of the airway by pushing on the soft tissue below the chin. Ensure that fingers are placed on the bony aspect of the mandible before lifting.** As this action can close the child's mouth, it may be necessary to use the thumb of the same hand to part the lips slightly. An infant's airway is usually optimised by tilting the head into a neutral position, while the older child's airway is better placed with the neck more extended in the 'sniffing' position. These are shown in Figures 16.3 and 16.4"	

Chapter 17 – Support of the airway and ventilation

Page	Change	Date
228	Correction to text of third bullet point in the Breathing section • Perform chest decompression if necessary	October 2023

229	Changing text of second bullet point and sub-bullet in Airway section
	• If evidence of obstruction **(e.g. snoring, secretions, stridor)** or altered consciousness:
	  ○ Perform airway-opening manoeuvres (common)
	  ○ Consider suction and foreign body removal (common), **especially if no improvement with airway opening manoeuvre**
		November 2023

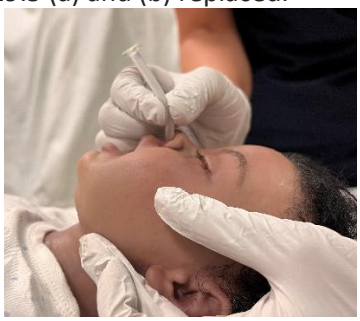
229	Correction to text of sub-bullet point in the Breathing section If evidence of tension pneumothorax: • perform immediate **thoracostomy** or needle decompression	October 2023

Chapter 18 – Management of cardiac arrest

Page	Change	Date
248	Revision of text in the bullet points of final paragraph at the bottom of the page: The only reasons to briefly interrupt CPR include: • To reassess the cardiac rhythm - every 2 minutes • To deliver a direct current (DC) shock - at the 2-minute rhythm check if needed • To perform rapid endotracheal intubation	January 2024
250	Change to the text of 6th bullet point in the 'Reversible causes' • **T**ension pneumothorax and cardiac **T**amponade are especially associated with PEA and should be suspected in a cardiac arrest as a result of trauma (see Chapter 9). Cardiac **T**amponade should also be considered in children with percutaneous intravenous central catheters and babies with umbilical venous catheters.	January 2024

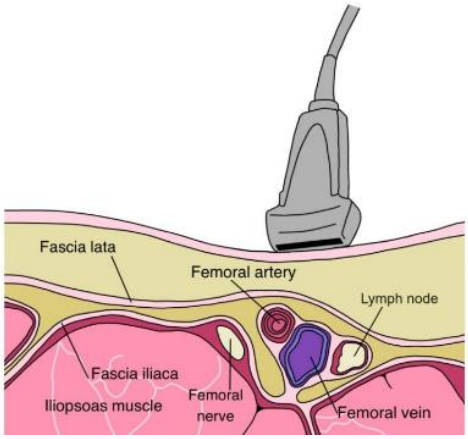
255	Text in Capnography section rewritten: **Capnography** Monitoring of end-tidal CO_2 ($ETCO_2$) during cardiac arrest has several benefits. Absence is likely to indicate oesophageal intubation, whereas presence is likely to indicate tracheal placement. Even in the presence of a waveform, care must be taken to establish that bronchial intubation or supraglottic placement has not occurred. This is through careful calculation of appropriate tube depth and auscultation of the chest. Whilst CPR is ongoing, chest x-ray is not a suitable method for confirming position. $ETCO_2$ is also a marker for pulmonary perfusion and so cardiac output. Presence of $ETCO_2$ relies on adequate CPR taking place. A low value, of less than 2kPa (15mmHg), should prompt attention to chest compression adequacy. Administration of adrenaline may cause a transient decrease in levels and sodium bicarbonate a transient increase. If a sharp rise in $ETCO_2$ is seen, it may indicate a return of spontaneous circulation. A threshold $ETCO_2$ should not be used as an indicator for stopping resuscitation.	November 2023

Chapter 19: Practical Procedures: airway and breathing

Page	Change	Date
265	Figure 19.5 (a) and (b) replaced. (a)  (b) 	December 2023

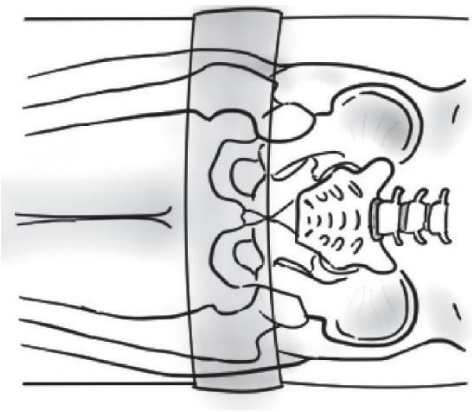
Chapter 20: Practical Procedures: circulation

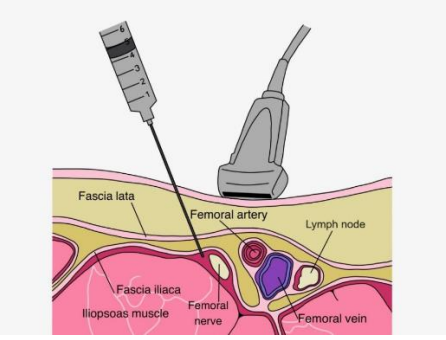
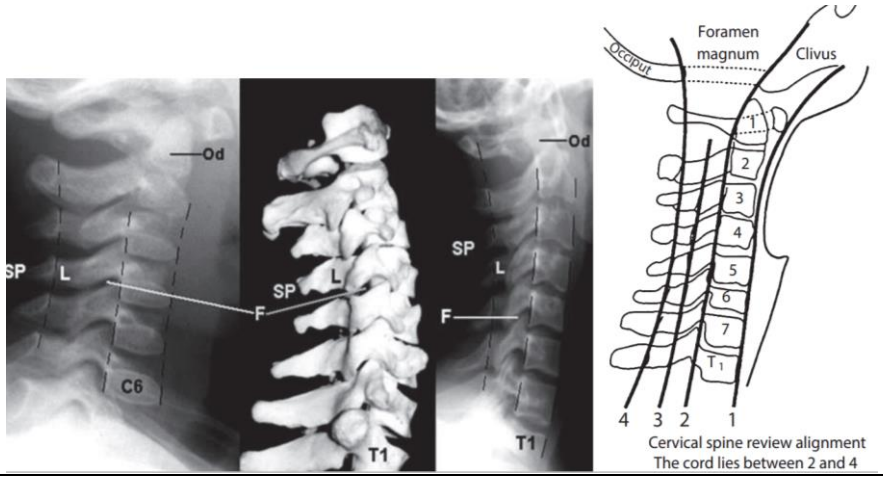
Page	Change	Date
282	Revision to text in Intraosseous fluid infusion procedure: Paragraph now reads " It should be noted that rapid infusion of fluid may be painful for the conscious patient and if this proves to be the case lignocaine (see formulary) may be infused slowly prior to medication/fluid administration to combat this."	January 2024

287	Figure 20.14 (a) updated - lymph node now labelled.  	November 2023
287	Revision to text in step 3 of the Femoral vein procedure with ultrasound guidance. “3. Wash hands before donning a sterile gown and gloves. Clean the skin at the appropriate site with a sterile wipe. Apply sterile drapes (if available).”	November 2023
288	Revision to text in step 3 of the Femoral vein procedure without ultrasound guidance. “3. Wash hands before donning a sterile gown and gloves. Clean the skin at the appropriate site with a sterile wipe. Apply sterile drapes (if available).”	November 2023
289	Revision to text in step 4 of the Femoral vein procedure with ultrasound guidance. “4. Wash hands before donning a sterile gown and gloves. Clean the skin at the appropriate side of the neck with a sterile wipe. Apply sterile drapes (if available).”	November 2023
290	Text edits as follows: Remove "without ultrasound" from the title of the section. Changes to the list as noted: 1. If the child is responsive to pain, provide pain relief. 2. Place the child in a 15-30° head-down position 3. Turn the head away from the site that is to be cannulated and restrain the child as necessary. 4. Put a small roll under the shoulder and pull down the arm towards the knee on the ipsilateral side i.e. the side where you are attempting insertion. 5. Wash hands before donning a sterile gown and gloves. Clean the skin over the upper side of the chest and neck with a sterile wipe. Apply sterile drapes (if available). 6. Identify the puncture site. This is 1cm lateral to the midpoint of the clavicle. 7. Attach the needle to the syringe and puncture the skin at the appropriate place.	November 2023

	8. Under supraclavicular ultrasound guidance (where available) direct the needle medially towards the clavicle, and "stepping down "off the bone, pass the needle under the clavicle. 9. Under continued ultrasound guidance (if available) direct the needle toward the suprasternal notch/contralateral shoulder and advance as superficially as possible, pulling back on the plunger of the syringe at the same time. Renumber remaining points from previous point 9, starting renumbering at 10.	
291	Radial artery cannulation text - edit to 4th bullet under Cannula: Adolescent to adult: 20 gauge	November 2023
294	Edits to the procedure: **Procedure: hands-free defibrillation** Basic life support should be interrupted for the shortest possible time (steps 8–11). **1.** Apply adhesive monitoring electrodes to the correct positions whilst compressions continue. **2.** Turn on the defibrillator **3.** Briefly stop compressions to assess the rhythm. If VF/pulseless VT: Move to step 4 to prepare to deliver a shock. If PEA/Asystole then jump to 11. **4.** Select the correct energy level required whilst compressions continue. **5.** Shout "CHARGING, oxygen away, continue compressions". **6.** Press the charge button whilst compressions continue. **7.** Wait until the defibrillator is charged. **8.** Shout "Stop compressions, everybody stand clear, (visual glance of monitor to check still shockable) SHOCKING". (If PEA/Asystole do not shock, but disarm/dump the charge and jump to 11) **9.** Check all personnel are clear and that the oxygen has been removed. **10.** Deliver the shock *whilst observing the patient*. **11.** Recommence CPR.	August 2023

Chapter 22 – Imaging and Trauma

Page	Change	Date
297	Replacement image Figure 21.2 Pelvic binder  	December 2023

299	Replacement of images, new Figure 21.4 20° tilt (four-person technique) 	January 2024
305	Figure 21.11 updated - lymph node now labelled. 	November 2023
315	Under abdominal imaging header, the last sentence in first paragraph change to: However, a formal USS of the abdomen performed by a radiologist may be helpful.	November 2023
319	Figure 22.6 line drawing updated to invert it to correlate with the X-rays. 	December 2023

Chapter 23 – Structured approach to stabilisation and transfer

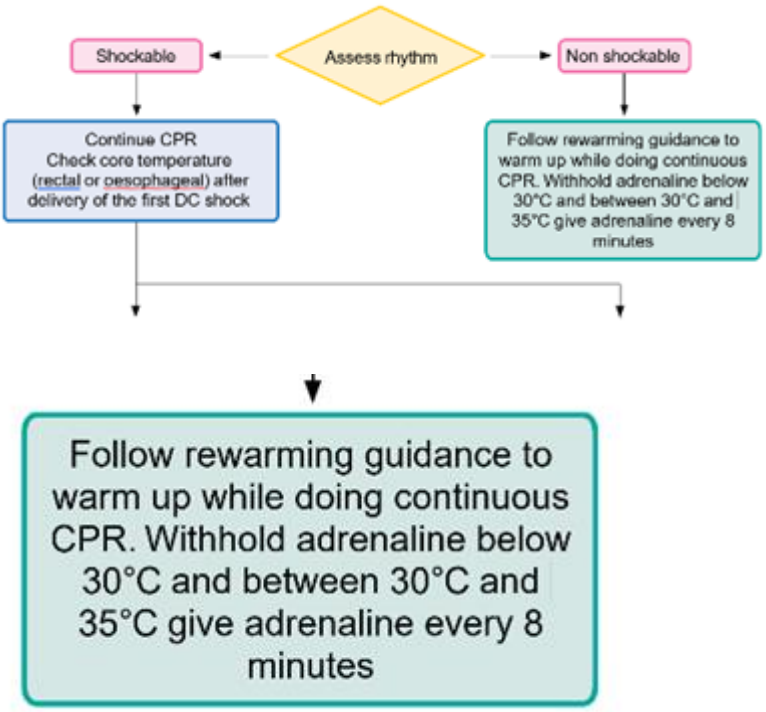
Page	Change	Date
324	Change to text in Airway and Breathing section, first bullet point, opening sentence: The endotracheal tube (ETT) should have a small leak until the cuff is inflated.	November 2023

Appendix C – Paediatric Major Trauma

Page	Change	Date
372	Row 6, column 3 of table, F-Fluids: Change text (5 ml/kg blood) to (10 ml/kg blood) Row 11, column 1 of table, Saline: Change text (Saline 3%) to (Saline 2.7% - 3%) Row 11, column 2 of table: Delete line (NUH: 2.7% sodium chloride) Row 12, column 2 of table, Calcium gluconate: Change text (0.2 ml/kg) to (0.5 ml/kg)	February 2024
373	Blood - Row 3, column 1 – change text 5 ml/kg to 10 ml/kg. Values in the following columns all changed from 5 ml/kg to 10 ml/kg up to 250 ml – see table below. Calcium gluconate – Row 6, column 1 – change text 0.2 ml/kg to 0.5ml/kg. Values in the following columns all changed from 0.2 ml/kg to 0.5 ml/kg up to 10 ml – see table below. Paracetamol – Row 9, column 1 – added text <10kg:10mg/kg. Values in columns 2 – 5 changed from 15 mg/kg to 10 mg/kg – see table below. Please use this link to access the updated table	February 2024

Please note: All doses can be given via INTRAVENOUS (IV) or INTRAOSSEOUS (IO) route																		
Age	Birth	1/12	3/12	6/12	1 yr	2 yr	3 yr	4 yr	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr	11 yr	12 yr	14 yr	Adult
Weight (kg)	3.5	4	5	8	10	12	14	16	18	20	23	24	28	30	35	40	50	70
Blood (FFP) 10 ml/kg	35 ml	40 ml	50 ml	80 ml	100 ml	120 ml	140 ml	160 ml	180 ml	200 ml	230 ml	240 ml	250 ml	250 ml	250 ml	250 ml	250 ml	250 ml
Tranexamic Acid (TXA 15 mg/kg)	52.5 mg	60 mg	75 mg	120 mg	150 mg	180 mg	210 mg	240 mg	270 mg	300 mg	345 mg	360 mg	420 mg	450 mg	525 mg	1 g	1 g	1 g
Hypertonic Saline (2.7–3%) 3 ml/kg over 10-20 mins >40 kg: 250 ml	10.5 ml	12 ml	15 ml	24 ml	30 ml	36 ml	42 ml	48 ml	54 ml	60 ml	69 ml	72 ml	84 ml	90 ml	105 ml	250 ml	250 ml	250 ml
Calcium Gluconate 0.5 ml/kg over 10-20 mins >20kg: 10 ml	1.75 ml	2.0 ml	2.5 ml	4.0 ml	5.0 ml	6.0 ml	7.0 ml	8.0 ml	9.0 ml	10 ml	10 ml	10 ml	10 ml	10 ml	10 ml	10 ml	10 ml	10 ml
Morphine 50–100 mcg/kg >40 kg: 2–10 mg	0.175–0.35 mg	0.2–0.4 mg	0.25–0.5 mg	0.32–0.8 mg	0.5–1 mg	0.6–1.2 mg	0.7–1.4 mg	0.8–1.6 mg	0.9–1.8 mg	1–2 mg	1.15–2.3 mg	1.2–2.4 mg	1.4–2.8 mg	1.5–3 mg	1.75–3.5 mg	2–4 mg	2–10 mg	2–10 mg
Fentanyl 0.5–1 mcg/kg >40 kg: 50–100 micrograms	1.75–3.5 mcg	2–4 mcg	2.5–5 mcg	3.2–8 mcg	5–10 mcg	6–12 mcg	7–14 mcg	8–16 mcg	9–18 mcg	10–20 mcg	11.5–23 mcg	13–26 mcg	14–28 mcg	15–30 mcg	17.5–35 mcg	20–40 mcg	50–100 mcg	50–100 mcg
Paracetamol 15 mg/kg IV infusion <10kg:10mg/kg >50 kg: 1 g	35 mg	40 mg	50 mg	80 mg	150 mg	180 mg	210 mg	240 mg	270 mg	300 mg	345 mg	360 mg	420 mg	450 mg	525 mg	800 mg	1 g	1 g

Appendix H – Drowning

Page	Change	Date
442	Change to text in green box on the non-shockable arm of Hypothermic child in cardiac arrest algorithm. Follow rewarming guidance to warm up while doing continuous CPR. Withhold adrenaline below 30°C and between 30°C and 35°C give adrenaline every 8 minutes.  	November 2023
443	Revision of text in H.5 Emergency treatment and stabilisation in drowning section, final sentence of third paragraph: When an infection is suspected, appropriate intravenous antibiotic therapy should be started after repeating blood and sputum cultures.	December 2023

Appendix J - Formulary

Page	Change	Date
467	Levetiracetam - maximum dose of IV Levetiracetam should be 3 g not 4.5 g Correction to Maximum single dose 3 g	November 2023
471	Correction to wording in infusion to "Use 1:1000 (1 mg/ml) **noradrenaline** concentrate"	February 2024
472	Paracetamol – rectal loading dose for 2-12 years should be 125-500 mg not mg/kg	December 2023

<table>
<tr><td>472</td><td>Paracetamol

Changes to the IV dosing information and age categories

<table>
<tr><td rowspan="3">Paracetamol</td><td rowspan="3">IV</td><td>Neonate 32 weeks corrected gestational age and above</td><td>Neonate</td><td>Infant and Child (up to 10 kg)</td><td>Child (10–50 kg)</td><td>Child (50 kg and above)</td></tr>
<tr><td rowspan="2">7.5 mg/kg every 8 hours, dose to be administered over 15 minutes.</td><td>10 mg/kg</td><td>10 mg/kg</td><td>15 mg/kg</td><td>1 g</td></tr>
<tr><td colspan="4">Notes: Every 4-6 hours
Give over 15 minutes
<10kg: max. daily dose 30mg/kg
10-50 mg/kg: max. daily dose 60mg/kg
>50 kg: max. daily dose 4g</td></tr>
</table>
</td><td>March 2024</td></tr>
</table>