Queensland Paediatric Emergency Care

Skill Sheets

Adrenaline (epinephrine) in Anaphylaxis

Adrenaline (epinephrine) is a drug that is used as a life-saving pharmacological intervention for multiple patient presentation types to the Emergency Department (ED). This skill sheet will focus on it's use in ANAPHYLAXIS. It is vital that the correct solution of adrenaline (epinephrine) is selected and prepared to the right concentration. 1:1000 concentration adrenaline (epinephrine) should be used in anaphylaxis.

Adrenaline (epinephrine)
1:1000
= 1mg in 1mL
= 1000mcg in 1mL

The first-line adrenaline (epinephrine) administration route for anaphylaxis is INTRAMUSCULARLY. Most children will respond well to intramuscular administration. Less commonly, adrenaline (epinephrine) administration may be requested as nebilised or to be given as a continuous infusion. This is only when the patient remains symptomatic after intramuscular adrenaline (epinephrine) has been given twice. All adrenaline (epinephrine) preparations for the emergency management of anaphylaxis are conducted as per Anaphylaxis and Allergy Guideline and Flowchart. It is highly recommended that the Children's Resuscitation Emergency Drug Dosage (CREDD) is utilised in all emergencies. Prior to all episodes of medication administration, the routine safety checks should be completed.

ALERT –

In all situations where adrenaline (epinephrine) is being administered, the child must be in a high acuity area and on cardiac monitoring. The patients should have continuous monitoring by a senior registered nurse and a senior medical officer should be readily available.

CREDD Tip:

20 kg

Intubation – prepare ONE size tube above and below recommended size			
ETT size – mm – CUFFED	5 mm	NG tube	10 - 12 Fr
ETT size – mm – UNCUFFED	5.5 mm	ICC tube	16 - 24 Fr
ETT at lips – cm	15 cm	LMA	2
ETT at nose – cm	18 cm	IDC	10 - 12 Fr

ANAPHYLAXIS		
IM Adrenaline (Epinephrine) 1:1000 (1 mg/mL)		
Dose	Volume	Autoinjector
200 microg	0.2 mL	150 microg

*Use autoinjector only if adrenaline 1:1000 not available

Resuscitation	Vial concentration	Recommended dose/kg	Preparation: Dilution – Sodium Chloride 0.9%	Preparation: Final concentration	Dose	Final volume to administer	Administration
Adrenaline (Epinephrine) 1:10 000 (1 mg/10 mL)	100 microg/mL	10 microg/kg	Undiluted	100 microg/mL	**200 microg**	2 mL	Push
DC shock – VF/ pulseless VT		4 Joule/kg	Round up energy level to next highest setting on defibrillator		**80 Joule**		Use paediatric or adult pads
AmiODARone (150 mg/3 mL)	50 mg/mL	5 mg/kg	*Dilute 3 mL (150 mg) to 15 mL in glucose 5%*	10 mg/mL	**100 mg**	10 mL	Push over 5 mins
Fluid Bolus		10 mL/kg	Sodium Chloride 0.9%			200 mL	Push
Fluid Bolus		20 mL/kg	Sodium Chloride 0.9%			400 mL	Push
Glucose 10%	100 mg/mL	2 mL/kg	Glucose 10%	100 mg/mL		40 mL	Push
Adenosine (6 mg/2 mL) – 1st dose	3 mg/mL	0.1 mg/kg	Undiluted	3 mg/mL	**2 mg**	0.67 mL	Push via proximal vein or CVL – Follow immediately by a 10 - 20 mL fast flush
Adenosine (6 mg/2 mL) – 2nd dose	3 mg/mL	0.2 mg/kg			**4 mg**	1.3 mL	
Adenosine (6 mg/2 mL) – 3rd dose	3 mg/mL	0.3 mg/kg			**6 mg**	2 mL	
Synchronised Cardioversion		1 Joule/kg	Round up energy level to next highest setting on defibrillator		**20 Joule**		Use paediatric or adult pads
		2 Joule/kg			**40 Joule**		
Atropine (600 microg/mL)	600 microg/mL	20 microg/kg	Dilute 1 mL (600 microg) to 6 mL	100 microg/mL	**400 microg**	4 mL	Push
Push dose pressors – Doses may be repeated if required							
Adrenaline (Epinephrine) 1:10 000 (1 mg/10 mL)	100 microg/mL	1 microg/kg	Dilute 1 mL (100 microg) to 10 mL	10 microg/mL	**20 microg**	2 mL	Push
Metaraminol (Syringe 5 mg/10 mL)	500 microg/mL	10 microg/kg	Consider Adrenaline (Epinephrine) Push Dose Pressor	Consult	**Consult**	Consult	Push

Induction agents	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Fentanyl (100 microg/2 mL)	50 microg/mL	2 - 5 microg/kg	Dilute 2 mL (100 microg) to 10 mL	10 microg/mL	**40 microg**	4 mL	Push over 1 - 3 mins
Ketamine (200 mg/2 mL)	100 mg/mL	1 - 2 mg/kg	Dilute 2 mL (200 mg) to 20 mL	10 mg/mL	**20 mg**	2 mL	Push over 60 secs
PropOFol (200 mg/20 mL)	10 mg/mL	2 - 3 mg/kg	Undiluted	10 mg/mL	**40 mg**	4 mL	Push over 30 secs
Midazolam	Various strengths	0.1 - 0.2 mg/kg	Dilute to 1 mg/mL regardless of ampoule strength	1 mg/mL	**2 mg**	2 mL	Push over 30 secs

Paralytic agents	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Rocuronium (50 mg/5 mL)	10 mg/mL	1.2 mg/kg	Undiluted	10 mg/mL	**24 mg**	2.4 mL	Push
Suxamethonium (100 mg/2 mL)	50 mg/mL	2 mg/kg	Dilute 2 mL (100 mg) to 10 mL	10 mg/mL	**40 mg**	4 mL	Push
Vecuronium (10 mg)	10 mg	0.1 mg/kg	*Reconstitute vial with 10 mL WFI*	1 mg/mL	**2 mg**	2 mL	Push

In the CREDD, INTRAMUSCULAR adrenaline (epinephrine) dosing is located in the top right-hand corner of the first page specific to a particular weight. In this example, the instructions pertain to a child with an ideal body weight (IBW) of 20kg.

The dosing section also contains information on the correct autoinjector dose to select where adrenaline (epinephrine) 1:1000 is unavailable.

INTRAMUSCULAR Adrenaline (epinephrine) Preperation

Please refer to the Anaphylaxis and Allergy Guideline and Flowchart in conjunction with this skill sheet.

1

Adrenaline (epinephrine)

Syringe of the appropriate size for administration

Drawing-up needle

Injection needle

70% alcohol - 2% chlorhexidine swab

ALERT

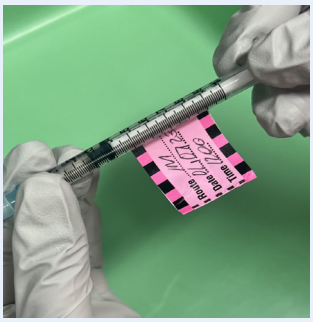
Adrenaline (epinephrine) as a first-line treatment for anaphylaxis should ONLY be administered INTRAMUSCULARLY.

2 PREPARE

Draw up dose required as per medical order. Use filter needle. Use CREDD to cross check dose.

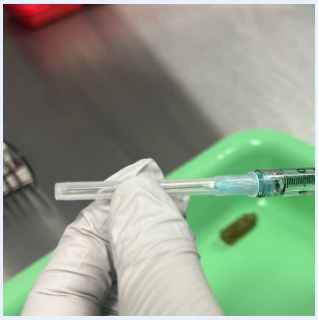
3

Label syringe as per national labelling standards.



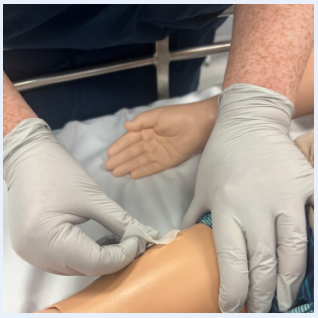
4

Change filter drawing-up needle for injection needle.



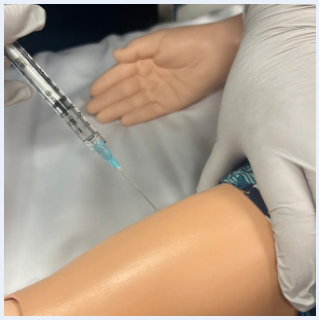
5

Clean injection site with alcohol swab.



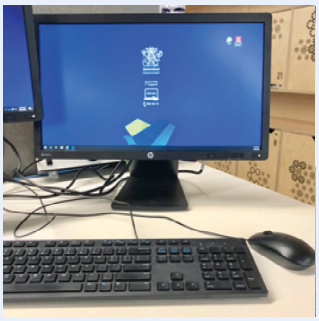
6

When directed by medical officer, administer dose into the most appropriate injection site.



9

Ensure that the administration is documented in the medical record.



NEBULISED Adrenaline (epinephrine) Preperation

Where there is need for greater than two intramuscular adrenaline (epinepherine) doses, nebulised adrenaline may be requested. Please refer to the Anaphylaxis and Allergy Guideline and Flowchart in conjunction with this skill sheet.

1 GATHER EQUIPMENT

1:1000 adrenaline vial x 5

Drawing-up needle

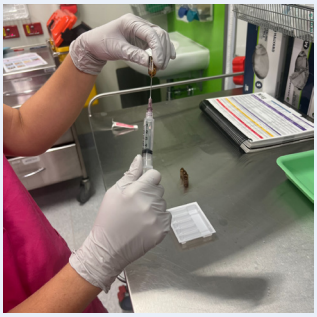
5mL syringe

Nebuliser pot and mask

Oxygen tubing

2 PREPARE

Draw up 5mL of 1:1000 adrenaline (epinephrine) into the 5mL syringe.



3

Put the 5mL of 1:1000 adrenaline (epinephrine) into the nebuliser pot.

4

Connect the nebuliser pot to the mask. Attach the oxygen tubing.

5

Attach the oxygen tubing to the wall high flow delivery system. Turn flow to at least 6L/min.

7

Put mask to patient's face for the duration of the administration.

CHALLENGES

Many children (particularly infant to pre-school aged) are afraid of the mask. It is essential to involve the child's caregiver in the process. The child will be made more at ease if age-appropriate communication strategies are utilised. For example, a game in which the mask is a make-believe space mask can turn the experience into a fun game.

It is vitally important that throughout the process that the child remains calm. Distress will worsen the symptoms.

Adrenaline can cause stinging to the eyes, therefore it is important that the top of the mask is well sealed around the nose and below the eyes.

Adrenaline (epinephrine) as INFUSION

Where there is an ongoing need for multiple doses of adrenaline (epinephrine) or inotropic support, an adrenaline infusion may be requested. Please refer to the Anaphylaxis and Allergy Guideline and Flowchart in conjunction with this skill sheet.

1 GATHER EQUIPMENT

Adrenaline (epinepherine)

49mL 0.9% Sodium Chloride or 5% Glucose

Drawing-up needle

50mL syringe

Smart site device

Low-volume IV extension

Infusion pump

*Where possible, intravenous adrenaline should be administered through a central point of venous access.

2 PREPARE

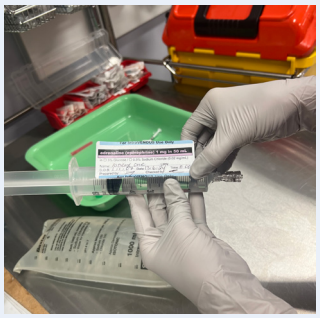
In a 50mL syringe, draw up 49mL of Sodium Chloride 0.9% or 5% Dextrose.

3

Draw up 1mL of adrenaline (epinephrine) 1:1000 and add to syringe with the 49mL from step 1. This will give a total volume of 50mL.

4

Label syringe according to national labelling guidelines.



5

Attach smart site device to syringe. Attach IV extension line to smart site device. Prime the line.

ALERT

The 'dead-space' in an IVC extension will cause a considerable delay in the patient receiving the adrenaline (epinephrine). Consider priming a new smart site and extension line prior to attaching to the patient, swapping the pre-existing smart site and extension for the newly primed one.

6

Load syringe into the infusion pump used in your HHS. Program pump as per the medical order.

For more information on expected ranges, refer to the CREDD.

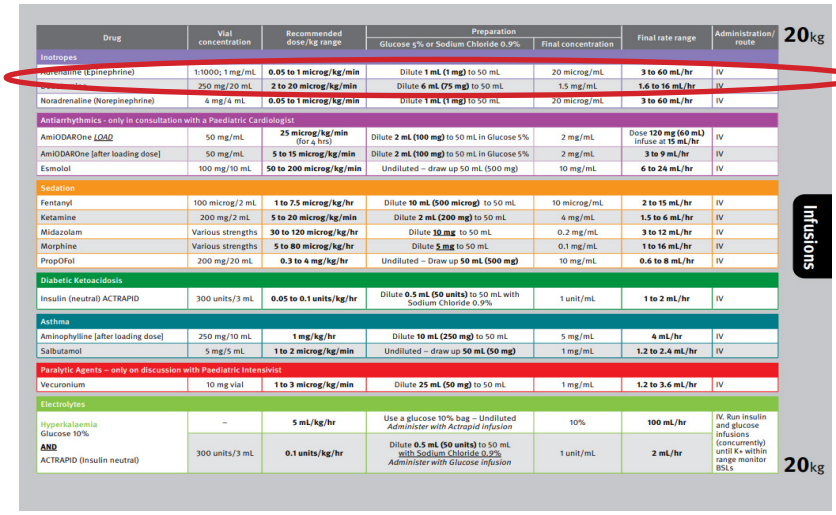
7

Document the rate and time of commencement of the infusion.

ALERT

Where INTRAVENOUS adrenaline is administered, continuous invasive blood pressure (BP) monitoring is strongly advised. This allows for immediate feedback on BP and accurate and safe titration of adrenaline administration rates.

CREDD Tip:



Drug	Vial concentration	Recommended dose/kg range	Preparation: Glucose 5% or Sodium Chloride 0.9%	Preparation: Final concentration	Final rate range	Administration/ route
Inotropes						
Adrenaline (Epinephrine)	1:1000; 1 mg/mL	**0.05 to 1 microg/kg/min**	Dilute **1 mL (1 mg)** to 50 mL	20 microg/mL	**3 to 60 mL/hr**	IV
[illegible]	250 mg/20 mL	**2 to 20 microg/kg/min**	Dilute **6 mL (75 mg)** to 50 mL	1.5 mg/mL	**1.6 to 16 mL/hr**	IV
Noradrenaline (Norepinephrine)	4 mg/4 mL	**0.05 to 1 microg/kg/min**	Dilute **1 mL (1 mg)** to 50 mL	20 microg/mL	**3 to 60 mL/hr**	IV
Antiarrhythmics - only in consultation with a Paediatric Cardiologist						
AmiODARone *LOAD*	50 mg/mL	**25 microg/kg/min** (for 4 hrs)	Dilute **2 mL (100 mg)** to 50 mL in Glucose 5%	2 mg/mL	Dose **120 mg (60 mL)** infuse at **15 mL/hr**	IV
AmiODARone [after loading dose]	50 mg/mL	**5 to 15 microg/kg/min**	Dilute **2 mL (100 mg)** to 50 mL in Glucose 5%	2 mg/mL	**3 to 9 mL/hr**	IV
Esmolol	100 mg/10 mL	**50 to 200 microg/kg/min**	Undiluted – draw up 50 mL (500 mg)	10 mg/mL	**6 to 24 mL/hr**	IV
Sedation						
Fentanyl	100 microg/2 mL	**1 to 7.5 microg/kg/hr**	Dilute **10 mL (500 microg)** to 50 mL	10 microg/mL	**2 to 15 mL/hr**	IV
Ketamine	200 mg/2 mL	**5 to 20 microg/kg/min**	Dilute **2 mL (200 mg)** to 50 mL	4 mg/mL	**1.5 to 6 mL/hr**	IV
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute **10 mg** to 50 mL	0.2 mg/mL	**3 to 12 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute **5 mg** to 50 mL	0.1 mg/mL	**1 to 16 mL/hr**	IV
PropOFol	200 mg/20 mL	**0.3 to 4 mg/kg/hr**	Undiluted – Draw up **50 mL (500 mg)**	10 mg/mL	**0.6 to 8 mL/hr**	IV
Diabetic Ketoacidosis						
Insulin (neutral) ACTRAPID	300 units/3 mL	**0.05 to 0.1 units/kg/hr**	Dilute **0.5 mL (50 units)** to 50 mL with Sodium Chloride 0.9%	1 unit/mL	**1 to 2 mL/hr**	IV
Asthma						
Aminophylline [after loading dose]	250 mg/10 mL	**1 mg/kg/hr**	Dilute **10 mL (250 mg)** to 50 mL	5 mg/mL	**4 mL/hr**	IV
Salbutamol	5 mg/5 mL	**1 to 2 microg/kg/min**	Undiluted – draw up **50 mL (50 mg)**	1 mg/mL	**1.2 to 2.4 mL/hr**	IV
Paralytic Agents – only on discussion with Paediatric Intensivist						
Vecuronium	10 mg vial	**1 to 3 microg/kg/min**	Dilute **25 mL (50 mg)** to 50 mL	1 mg/mL	**1.2 to 3.6 mL/hr**	IV
Electrolytes						
Hyperkalaemia Glucose 10% **AND** ACTRAPID (Insulin neutral)	– 300 units/3 mL	**5 mL/kg/hr** **0.1 units/kg/hr**	Use a glucose 10% bag – Undiluted *Administer with Actrapid infusion* Dilute **0.5 mL (50 units)** to 50 mL with Sodium Chloride 0.9% *Administer with Glucose infusion*	10% 1 unit/mL	**100 mL/hr** **2 mL/hr**	IV. Run insulin and glucose infusions (concurrently) until K+ within range monitor BSLs

20kg

Infusions

20kg

In the CREDD, INFUSIONS are on the final page of medications per weight section. Instructions for the preperation of an adrenaline (epinephrine) infusion are listed first on the INFUSIONS page.

Dosing weights are listed down the right-hand side of the page. In this example, the instructions pertain to a child with an ideal body weight (IBW) of 20kg.

For further information:

Guideline: Allergy and anaphylaxis - Emergency management in children

Videos:

CREDD Education: IM Adrenaline for Anaphylaxis

CREDD Education: IV Adrenaline Infusion

References:

Children's Health Queensland Hospital and Health Service. (2021, June). Children's Resuscitation Emergency Drug Dosage (CREDD) 2nd Edition. Retrieved from https://www.childrens.health.qld.gov.au/qpec-paediatric-resuscitation-tools/#tab-6ff1bb73468033104a2

Children's Health Queensland Hospital and Health Service. (2021, February 26). Allergy and Anaphylaxis - Emergency management in children. Retrieved from https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/guidelines/CHQ-GDL-60011-allergy-anaphylaxis.pdf

This Queensland Paediatric Emergency Skill Sheet was developed by the Emergency Care of Children working group.

Skill Sheet Legal Disclaimer

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- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management.
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary.
- Ensuring informed consent is obtained prior to delivering care.
- Meeting all legislative requirements and professional standards.
- Applying standard precautions, and additional precautions as necessary, when delivering care.
- Documenting all care in accordance with mandatory and local requirements.

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