Children's Resuscitation Emergency Drug Dosage CREDD

Practical Skills

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Aim: Provide practical medication preparation experience using the CREDD

Key messages:
- Safe medication prescription and preparation
- Teamwork – double checking
- Familiarity with drug infusion pump and drug library
- Highlight risks and embed local medication safety practices

Participants: Clinicians involved in the preparation of paediatric resuscitation medications.
Time: 30 – 45 minutes

Facilitation:
Introduce each case. Provide the opportunity to prepare medications in pairs, answering questions as they arise. Utilize demonstration pages as support.
Following each case identify and discuss challenges. Escalate using local quality improvement process.

Equipment:
Use in date medications only in the clinical space
Use an ampoule of sterile water as controlled medication
Simulated medications should can be used in training room only

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

❑Case 1

A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires intubation

Medical Officer has ordered:
- Ketamine 12 mg (1 mg / kg)
- Rocuronium 14 mg (1.2mg / kg)

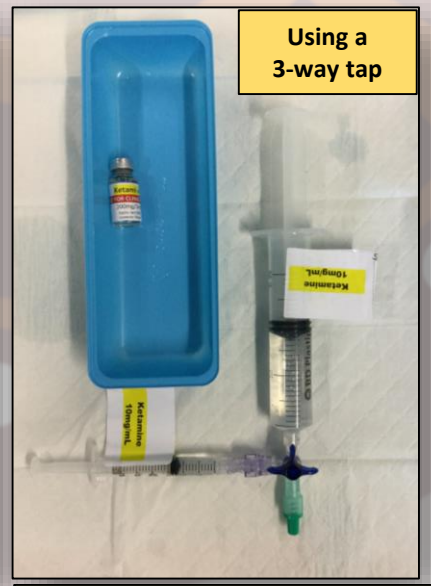
Use CREDD: Prepare Ketamine standard concentration mothership and dose

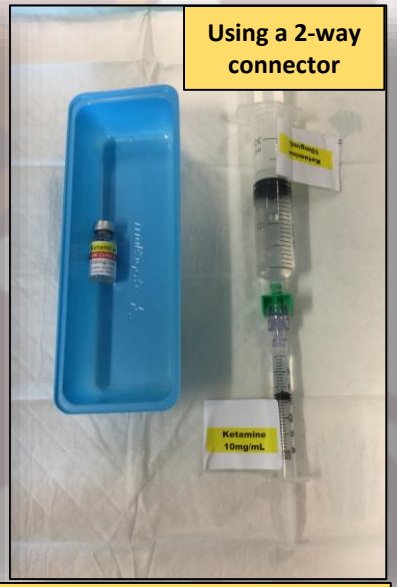
Use CREDD: Prepare Rocuronium standard concentration mothership and dose

Children's Resuscitation Emergency Drug Dosage CREDD

Case 1 : A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires intubation.
Medical Officer has ordered:
- Ketamine 12 mg (1 mg / kg)
- Rocuronium 14 mg (1.2 mg / kg)

Ketamine





2 mL (200 mg) Ketamine / 18 mL NaCl-

Decant 1.2 mL (12 mg) from Ketamine mothership 10 mg/mL

Induction agents	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Ketamine (200 mg/2 mL)	100 mg/mL	1-2 mg/kg	Dilute 2 mL (200 mg) to 20 mL	10 mg/mL	**12 mg**	1.2 mL	Push over 60 secs

12 kg

Rocuronium

Draw up 50 mg in 5 mL Rocuronium neat = 10 mg / mL
Decant 1.4 mL (14 mg) from Rocuronium mothership 10 mg/mL

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	**14.4 mg**	1.4 mL	Push

12 kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

- Case 2:

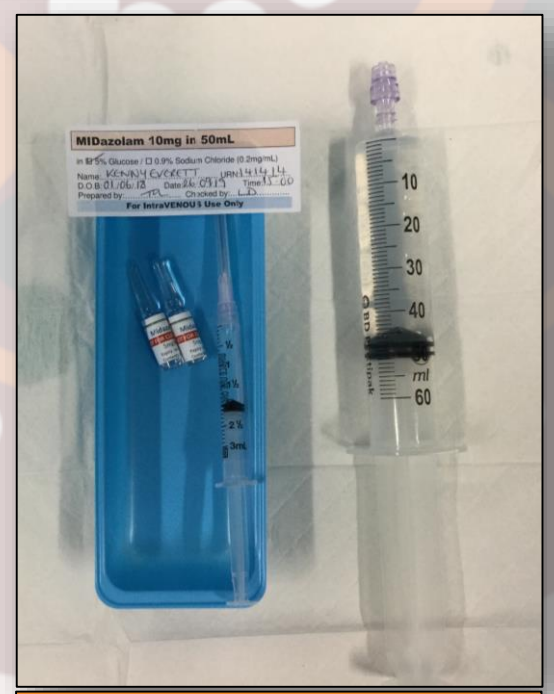
A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires intubation

Prepare ongoing sedation and analgesia to be used post intubation

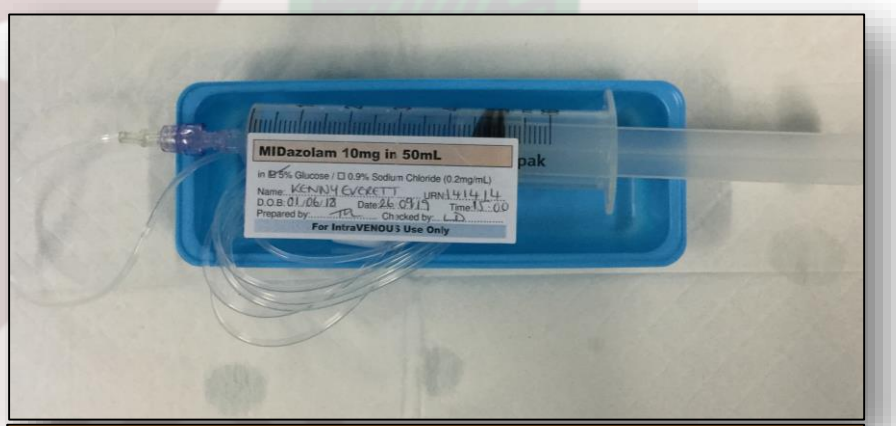
Use CREDD: Prepare Midazolam infusion – commence at 10 microg / Kg / hr
Use CREDD: Prepare Morphine infusion – commence at 30 microg / kg / hr

Children's Resuscitation Emergency Drug Dosage CREDD

Midazolam



10 mg Midazolam / 48 mL
5% Dextrose or NaCl-



10 mg Midazolam in 50 mL = 0.2 mg / mL

Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

12 kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using Smart Pump
- DERS

Midazolam

Select Midazolam 10 mg / 50 mL
Enter Weight / OK
Enter Dose / OK

Double Check
Select Start to commence

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

12 kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr

Midazolam

Enter Rate / OK
Enter Volume To Be Infused / OK

Double Check
Select Start to commence

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

12 kg

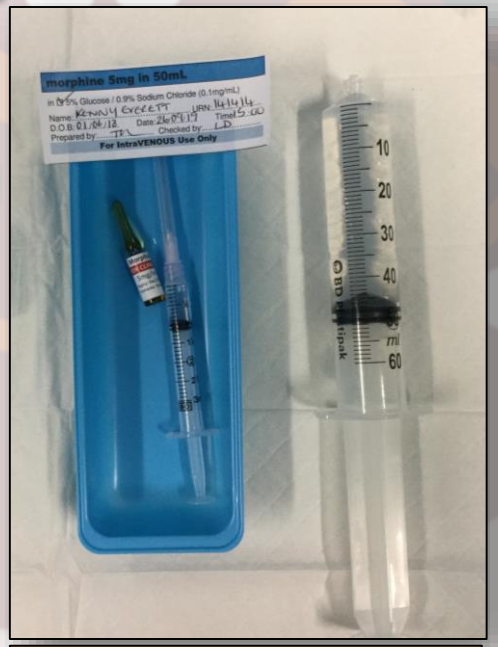
Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

Morphine



5 mg Morphine / 49 mL
5% Dextrose or NaCl-

5 mg Morphine in 50 mL = 0.1 mg / mL

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

12 kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using Smart Pump
- DERS

Morphine

Select Morphine 5 mg / 50 mL / OK
Enter Weight / OK

Enter Dose / OK Double Check
Select Start to commence

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

12 kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr

Morphine

Enter Rate / OK
Enter Volume To Be Infused / OK

Double Check
Select Start to commence

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
Sedation						
Midazolam	Various strengths	**30 to 120 microg/kg/hr**	Dilute 10 mg (10 mg) to 50 mL	0.2 mg/mL	**1.8 to 7.2 mL/hr**	IV
Morphine	Various strengths	**5 to 80 microg/kg/hr**	Dilute 5 mg (5 mg) to 50 mL	0.1 mg/mL	**0.6 to 9.6 mL/hr**	IV

Case 2: A 15 month old child weighing 12 kg with pneumonia and severe hypoxemia requires post intubation sedation. Medical Officer has ordered:
- Midazolam infusion commence at 30microg / kg / hr
- Morphine infusion commence at 10 microg / kg / hr

12 kg

The OPTIMUS Project

This page is intentionally left blank
For Printing Purposes

Children's Resuscitation Emergency Drug Dosage CREDD

❑Case 3 :

A 3 year old child weighing 14 kg is in septic shock

Medical Officer orders:
- Push dose pressor Adrenaline 15 microgram
- In anticipation of this child arresting an arrest dose of Adrenaline is requested
- Adrenaline infusion

Use CREDD:

Prepare Adrenaline push dose pressor standard concentration mothership & dose
Prepare Adrenaline 140 microgram – arrest dose
Prepare Adrenaline infusion to commence at 0.05 microgram / Kg / min

Children's Resuscitation Emergency Drug Dosage CREDD

Case 3: A 3 year old child weighing 14 kg is in septic shock
Medical Officer orders:
- push dose pressor adrenaline 15 microgram
- arrest dose Adrenaline 140 microgram

Adrenaline Push Dose Pressor

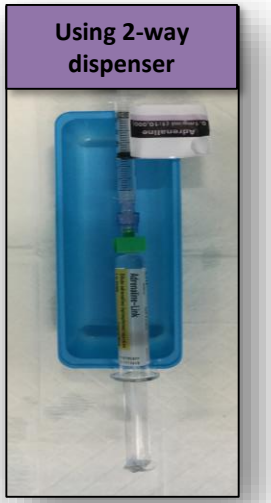
Decant
1 mL (100 microg) Adrenaline from
1 mg Adrenaline (1:10 000)

Dilute to 10 mL with NaCl- = 10 microg / mL (1:100 000)
Decant
1.4 mL (14 microg) Adrenaline from Adrenaline mothership

Resuscitation	Vial concentration	Recommended dose/kg	Preparation		Dose	Final volume to administer	Administration
			Dilution – Sodium Chloride 0.9%	Final concentration			
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	14 microg	1.4 mL	Push

14kg

Adrenaline Arrest Dose



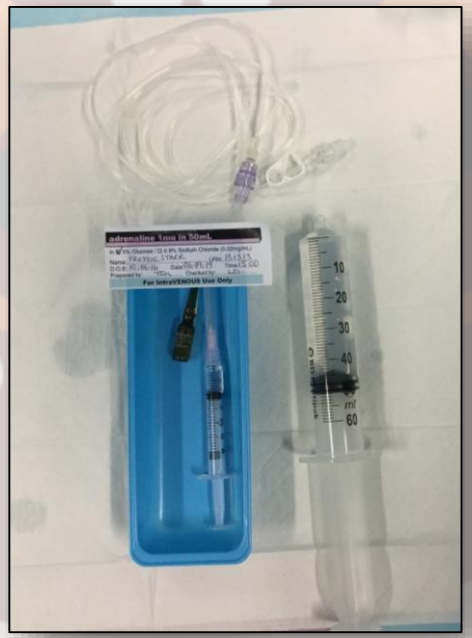
Decant 1.4 mL (140 microg) Adrenaline from Adrenaline 1mg (1:10 000)

Resuscitation	Vial concentration	Recommended dose/kg	Preparation		Dose	Final volume to administer	Administration
			Dilution – Sodium Chloride 0.9%	Final concentration			
Adrenaline (Epinephrine) 1:10 000 (1 mg/10 mL)	100 microg/mL	10 microg/kg	Undiluted	100 microg/mL	140 microg	1.4 mL	Push

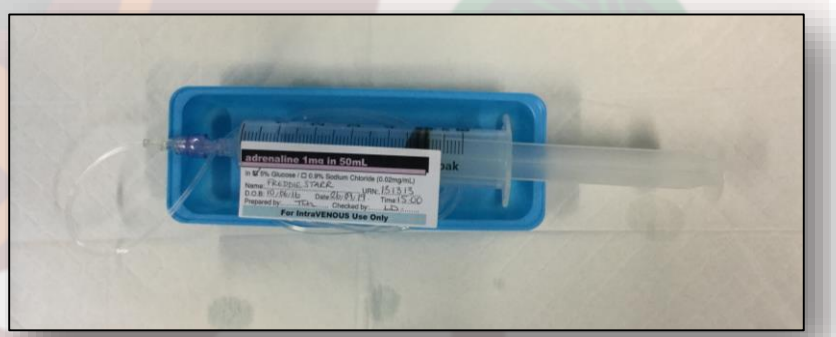
The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Adrenaline Infusion



1 mg Adrenaline / 49 mL 5% Dextrose or NaCl-



1 mg Adrenaline in 50 mL = 20 microg / mL

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route	14kg
			5% glucose or Sodium Chloride 0.9%	Final concentration			
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	2.1 to 42 mL/hr	IV	

Case 3: A 3 year old child weighing 14 kg is in septic shock
Medical Officer orders:
- Adrenaline infusion to commence at 0.05 microgram / Kg / min

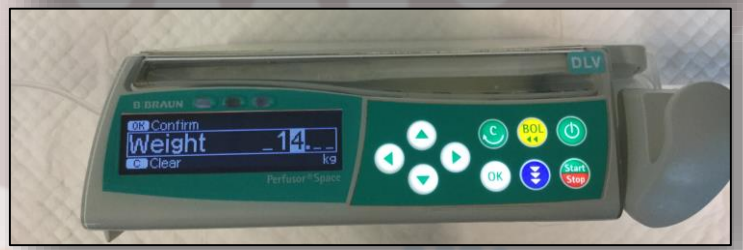
The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Case 3: A 3 year old child weighing 14 kg is in septic shock
Medical Officer orders:
- Adrenaline infusion to commence at 0.05 microgram / Kg / min

Using Smart Pump
- DERS

Adrenaline Infusion



Select Adrenaline 1 mg / 50 mL / OK
Enter Weight / OK

Enter Dose / OK
Double Check / Select Start

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route	14kg
			5% glucose or Sodium Chloride 0.9%	Final concentration			
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	2.1 to 42 mL/hr	IV	

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Case 3: A 3 year old child weighing 14 kg is in septic shock
Medical Officer orders:
- Adrenaline infusion to commence at 0.05 microgram / Kg / min

Using mL / hr

Adrenaline Infusion

Enter Rate / OK

Enter Volume To Be Infused / OK

Double Check / Select Start to commence

Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route	14kg
			5% glucose or Sodium Chloride 0.9%	Final concentration			
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	2.1 to 42 mL/hr	IV	

The OPTIMUS Project

This page is intentionally left blank
For Printing Purposes

Children's Resuscitation Emergency Drug Dosage CREDD

- Case 4 :

A 7 year old child, 22 Kg, with seizures
Medical Officer has ordered:
- Midazolam 6.6 mg intranasal (0.3 mg / Kg)
- Midazolam 2.2 mg IV (0.1 mg / Kg)
- Phenytoin 440 mg (20 mg / Kg)
- Levetiracetam 880 mg (40 mg / Kg)

Use CREDD: Prepare Midazolam
- neat for Intranasal dose
- standard concentration mother ship and dose IV

Use CREDD: Prepare Phenytoin load
Use CREDD: Prepare Levetiracetam bolus dose

Children's Resuscitation Emergency Drug Dosage CREDD

Case 4 : A 7 year old child 22 Kg with seizures:
Medical Officer has ordered:
- Midazolam 6.6 mg intranasal (0.3 mg / Kg)
- Midazolam 2.2 mg IV (0.1 mg / Kg)

Midazolam Intranasal /Buccal

1.3 mL (6.6 mg) Midazolam Neat
- use Nasal atomiser
- drip in cheek pocket Buccal

Midazolam IV

IV 1 mL (5 mg) Midazolam / 4 mL NaCl-

Using a 3-way tap

Using a 2-way dispenser

Decant 2.2 mL (2.2 mg) from Midazolam mothership 1 mg / mL

Neurology/seizures	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Midazolam – **IV**	Various strengths	0.1 mg/kg	Dilute to 1 mg/mL regardless of ampoule strength	1 mg/mL	**2.2 mg**	2.2 mL	Push
Midazolam – **IM**	5 mg/mL	0.2 mg/kg	Undiluted	5 mg/mL	**4.4 mg**	0.88 mL	IM
Midazolam – **Buccal/Nasal**	5 mg/mL	0.3 mg/kg	Undiluted	5 mg/mL	**6.6 mg**	1.3 mL	Drip dose into alternate nostrils or inside cheek

22kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Case 4 : A 7 year old child 22 Kg with seizures:
Medical Officer has ordered:
- Phenytoin 440 mg (20 mg / Kg)
- Levetiracetam 880 mg (40 mg / Kg)

Phenytoin Load

10 mL (100 mg) Phenytoin / 40 mL NaCl-

10 mg Phenytoin / mL

44 mL (440 mg) Phenytoin 0.22 micron filter

Levetiracetam Push

10 mL (1000 mg) Levetiracetam + 10 mL NaCl- = 50 mg / mL

17.6 mL (880 mg) Levetiracetam

Neurology/seizures	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Phenytoin (100 mg/2 mL) (250 mg/5 mL)	50 mg/mL	20 mg/kg	Dilute 10 mL (500 mg) to 50 mL	10 mg/mL	**440 mg**	44 mL	Infuse over 20 mins *use 0.22 micron filter*
Levetiracetam (500 mg/5 mL)	100 mg/mL	40 mg/kg	Dilute 10 mL (1000 mg) to 20 mL	50 mg/mL	**880 mg**	17.6 mL	Push over 5 mins

22kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using Smart Pump
- DERS

Case 4 : A 7 year old child 22 Kg with seizures:
Medical Officer has ordered:
- Phenytoin 440 mg (20 mg / Kg)
- Levetiracetam 880 mg (40 mg / Kg)

Phenytoin Load

Select Dose
Adjust time / Adjust volume to be infused

Double Check /
Select Start to commence

Levetiracetam Push over 5 min

Neurology/seizures	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Phenytoin (100 mg/2 mL) (250 mg/5 mL)	50 mg/mL	20 mg/kg	Dilute 10 mL (500 mg) to 50 mL	10 mg/mL	**440 mg**	44 mL	Infuse over 20 mins *use 0.22 micron filter*
Levetiracetam (500 mg/5 mL)	100 mg/mL	40 mg/kg	Dilute 10 mL (1000 mg) to 20 mL	50 mg/mL	**880 mg**	17.6 mL	Push over 5 mins

22kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr
44 mL x 3 = 132 mL / hr

Case 4 : A 7 year old child 22 Kg with seizures:
Medical Officer has ordered:
- Phenytoin 440 mg (20 mg / Kg)
- Levetiracetam 880 mg (40 mg / Kg)

Phenytoin Load

Enter Rate
Enter Volume To Be Infused

Double Check
Select Start to commence

Neurology/seizures	Vial concentration	Recommended dose/kg	Dilution – Sodium Chloride 0.9%	Final concentration	Dose	Final volume	Administration
Phenytoin (100 mg/2 mL) (250 mg/5 mL)	50 mg/mL	20 mg/kg	Dilute 10 mL (500 mg) to 50 mL	10 mg/mL	**440 mg**	44 mL	Infuse over 20 mins *use 0.22 micron filter*
Levetiracetam (500 mg/5 mL)	100 mg/mL	40 mg/kg	Dilute 10 mL (1000 mg) to 20 mL	50 mg/mL	**880 mg**	17.6 mL	Push over 5 mins

Levetiracetam Push over 5 min

22kg

The OPTIMUS Project

Children's Resuscitation Emergency Drug Dosage CREDD

Practical Skills

Published by the State of Queensland (Queensland Health), October 2019

For more information contact the CREDD team at CREDD@health.qld.gov.au
For content enquiries or feedback email Simulation Training Optimising Resuscitation for Kids (STORK) Unit, Queensland Children's Hospital, 501 Stanley St, South Brisbane QLD 4101, stork@health.qld.gov.au

Disclaimer:

The content presented in this publication is distributed by the Queensland Government including Children's Health Queensland as an information source only. The State of Queensland including Children's Health Queensland make no statements, representations or warranties about the accuracy, completeness or reliability of any information contained in this publication. The State of Queensland including Children's Health Queensland disclaims all responsibility and all liability (including without limitation for liability in negligence for all expenses, losses, damages and costs you might incur as a result of the information being inaccurate or incomplete in any way, and for any reason reliance was placed on such information. This resource has been designed as an educational resource to practice drug administration in emergency situations using the CREDD book. Whilst the information contained herein has gone through a vigorous checking and referencing process it is not a substitute for thinking and checking.

The OPTIMUS Project