

# Children's Resuscitation Emergency Drug Dosage CREDD Practical Skills



# 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

# 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)

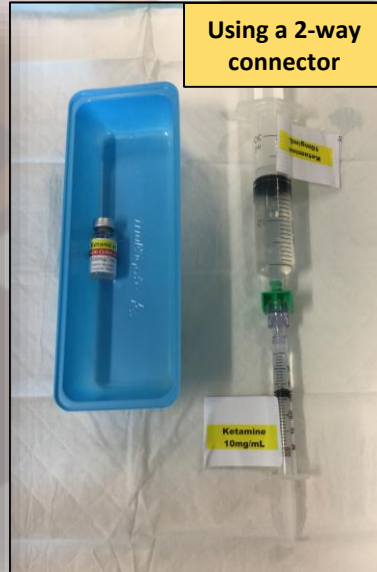
## Ketamine



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



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



12 kg

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

## 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



12 kg

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

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# Children's Resuscitation Emergency Drug Dosage CREDD

## ☐ Case 2:

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

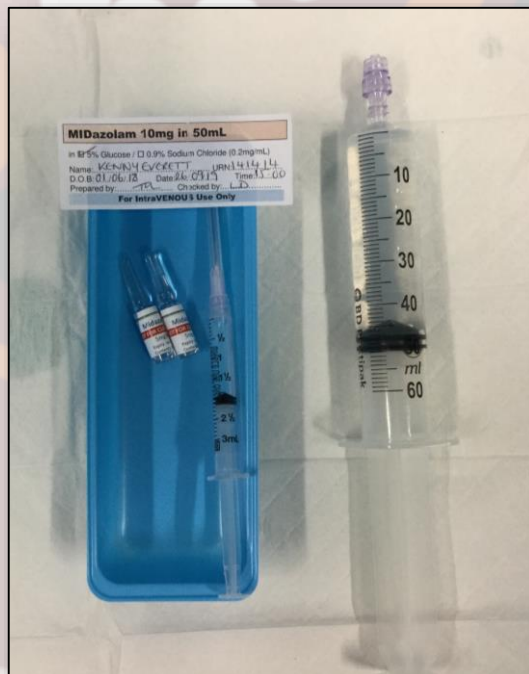
Prepare ongoing sedation and analgesia to be used post intubation

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

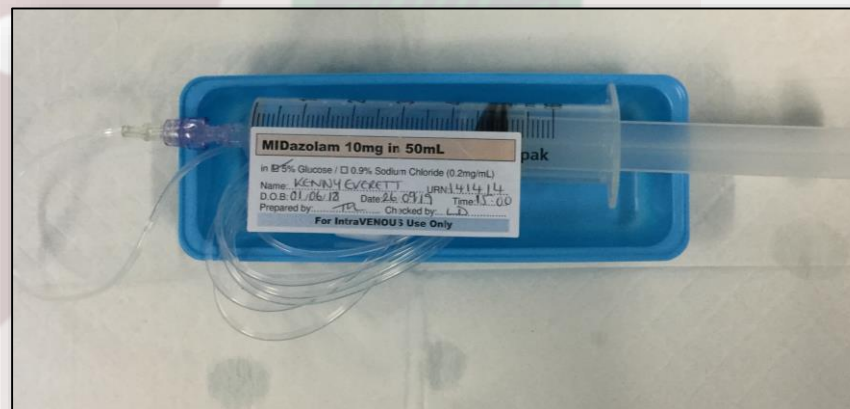
Use CREDD: Prepare Morphine infusion – commence at 30 microg / kg / hr

# 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		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> 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 <b>5 mg (5 mg)</b> to 50 mL	0.1 mg/mL	0.6 to 9.6 mL/hr	IV

12 kg

# Children's Resuscitation Emergency Drug Dosage CREDD

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Midazolam

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



Select Midazolam



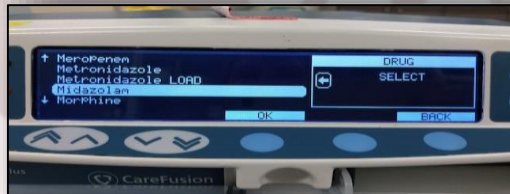
Enter Weight / OK  
Enter Dose / OK



Enter Volume To Be Infused  
Confirm Syringe Type



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		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> 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 <b>5 mg (5 mg)</b> to 50 mL	0.1 mg/mL	0.6 to 9.6 mL/hr	IV

12 kg

# Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr

Midazolam

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



Select mL / hr  
OK



Enter Rate / OK



Enter Volume To Be Infused / OK  
Double Check / Select Start to commence

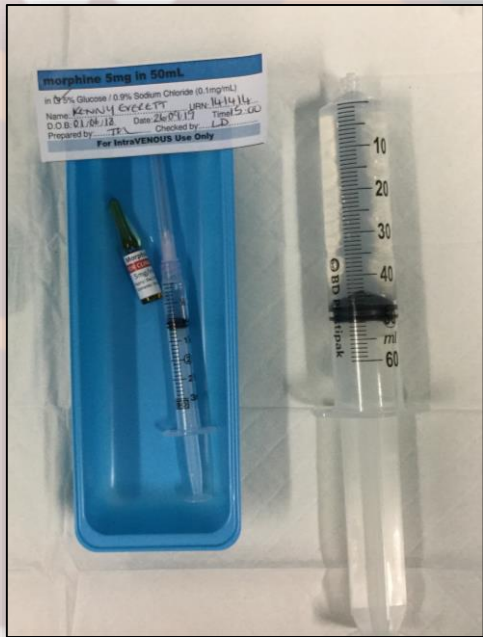
Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration / route
			5% glucose or Sodium Chloride 0.9%	Final concentration		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> to 50 mL	0.2 mg/mL	1.8 to 7.2 mL/hr	IV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

12 kg



# Children's Resuscitation Emergency Drug Dosage CREDD

## Morphine



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



5 mg Morphine in 50 mL = 0.1 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		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> 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 <b>5 mg (5 mg)</b> 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

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Morphine

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



Select Morphine  
5 mg / 50 mL OK



Enter Weight / OK  
Enter Dose / OK



Enter Volume to be infused  
Double Check



Confirm setup / OK  
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		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> 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 <b>5 mg (5 mg)</b> to 50 mL	0.1 mg/mL	0.6 to 9.6 mL/hr	IV

12 kg

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# Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr

Morphine

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



Select mL / hr  
OK



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		
<b>Sedation</b>						
Midazolam	Various strengths	30 to 120 microg/kg/hr	Dilute <b>10 mg (10 mg)</b> 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 <b>5 mg (5 mg)</b> to 50 mL	0.1 mg/mL	0.6 to 9.6 mL/hr	IV

12 kg

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# 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

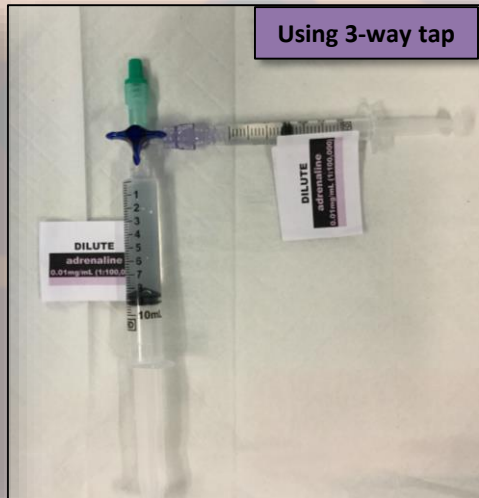
Prepare Adrenaline 140 microgram – arrest dose

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

## 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			
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

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

# 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

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

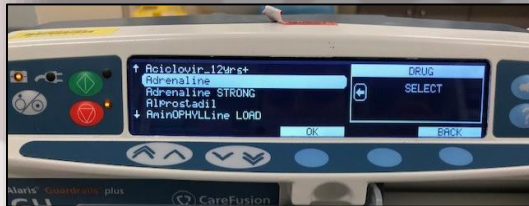
Drug	Vial concentration	Recommended dose/kg range	Preparation		Final rate range	Administration/ route	14kg
			5% glucose or Sodium Chloride 0.9%	Final concentration			
<b>Inotropes</b>							
Adrenaline (Epinephrine)	1:1000; 1 mg/mL	0.05 to 1 microg/kg/min	Dilute 1 mL (1 mg) to 50 mL	20 microg/mL	2.1 to 42 mL/hr	IV	

# Children's Resuscitation Emergency Drug Dosage CREDD

Using Smart Pump  
- DERS

## Adrenaline Infusion

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



Select Adrenaline  
1 mg / 50 mL / OK



Enter Weight / OK  
Enter Dose / OK



Enter Volume to be infused  
Double Check



Confirm setup / OK  
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			
<b>Isotropes</b>							
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	



# 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**



Select mL / hr  
OK



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			
<b>Inotropes</b>							
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	

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# 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



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

## Using a 2-way dispenser



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

# 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

## Levetiracetam Push



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



10 mg Phenytoin / mL



44 mL (440 mg) Phenytoin 0.22 micron filter



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

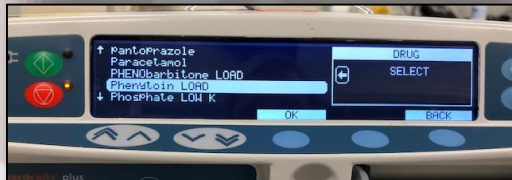
22kg

# Children's Resuscitation Emergency Drug Dosage CREDD

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## Phenytoin Load

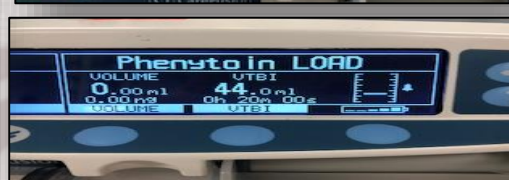
Case 4 : A 7 year old child 22 Kg with seizures:  
Medical Officer has ordered:  
- Phenytoin 440 mg (20 mg / Kg)  
- Levetiracetam 880 mg (40 mg / Kg)



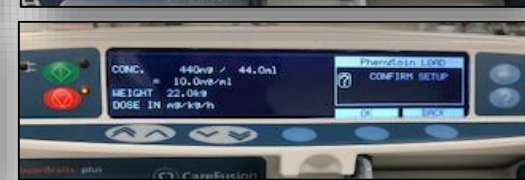
Select Phenytoin Load  
OK



Enter Weight / OK  
Enter Dose / OK



Enter Volume To Be Infused  
Double Check



Confirm setup / OK  
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

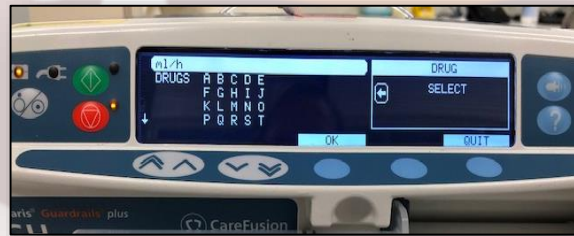
22kg

# Children's Resuscitation Emergency Drug Dosage CREDD

Using mL / hr  
 $44 \text{ mL} \times 3 = 132 \text{ mL / hr}$

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**



Select mL / hr  
OK



Enter Rate  
OK



Enter Volume To Be Infused / OK  
 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

22kg

# 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)

**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



# Children's Resuscitation Emergency Drug Dosage CREDD Practical Skills

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