

Paediatric: Calcium Gluconate

Presentation:	Intravenous solution (10 ml ampoule of Calcium Gluconate 10%) 1 ml contains 0.225 mmol of elemental Ca ²⁺	
Indications:	<ol style="list-style-type: none"> 1. Acute asymptomatic hypocalcaemia 2. Symptomatic hypocalcaemia (i.e. seizures, tetany) 3. Hyperkalaemia (prevention of arrhythmias) 4. Cardiac arrest in the presence of hyperkalaemia and/or hypocalcaemia 5. Calcium channel blocker toxicity – SEE TOXBASE 	
Dose:	For indications 1.2.3.4 as above - given as a single dose.	<p>Single dose: dilute as detailed below and give by slow IV injection over 5–10 minutes with heart rate, ECG and BP monitoring (risk of arrhythmias if given too rapidly). Do not exceed 0.5mmol/minute.</p> <p>Child <1 month – See NICU guideline</p> <p>Child 1 month – 18 years: 0.11 mmol/kg (0.5 mL/kg of calcium gluconate 10%), max 4.5 mmol (20 mL calcium gluconate 10%)</p> <p>In emergencies can be given undiluted via a central venous access device.</p>
	Acute hypocalcaemia (maintenance infusion) via SMART PUMP	<p>Continuous IV infusion: dilute as detailed below and administer via an infusion pump with ECG monitoring, heart rate, BP and plasma-calcium levels.</p> <p>Child <1 month – See NICU guideline</p> <p>Child 1 month – 2 years: 1 mmol/kg daily (usual max 8.8 mmol) by continuous IV infusion over 24 hours, adjusted according to response (<i>max rate: 0.045 mmol/kg/hour</i>)</p> <p>Child 2 – 18 years: 8.8 mmol by continuous IV infusion over 24 hours, adjusted according to response (<i>max rate: 0.045 mmol/kg/hour</i>)</p>
Route of administration:	<ul style="list-style-type: none"> – Central intravenous route is preferred – Extreme caution: – Calcium gluconate undiluted has high osmolality and may cause venous irritation/tissue damage in extravasation. If central venous access device is unavailable, dilute as below and administer via large peripheral vein, monitoring insertion site closely. Resite cannula at first signs of inflammation. Intramuscular and subcutaneous administration is contraindicated. - Use oral route as soon as possible due to risk of extravasation 	
Instructions for preparation and administration:	<p>Single dose: dilute with Glucose 5% (preferred) or Sodium Chloride 0.9% to a concentration of 0.045 mmol/ml (minimum dilution should be 1 in 5: i.e. dilute each 1 mL of calcium gluconate 10% with 4 mL of diluent)</p> <p>It may be given more concentrated via a central line if necessary in an emergency or in fluid restricted patients (neat injection solution is used in some centres).</p>	
	<p>Continuous IV (maintenance) infusion: To calculate concentration of infusion for SMART pumps:</p>	

	<p>standard strength will be prepared by Pharmacy where possible. If required more quickly prepare as below:</p> <ul style="list-style-type: none"> • Draw up 9ml of 10% calcium gluconate into a 50ml syringe • Make up to 50ml using glucose 5% (preferred) or sodium chloride 0.9% • Syringe now contains 2.025 mmol calcium in 50ml i.e. 0.04mmol/ml • Volume required per 24 hours (ml)(1month–2years) = $\frac{\text{dose (mmol/kg/day)} \times \text{weight (kg)}}{0.04}$ • Divide by 24 to work out hourly infusion rate 																														
<p>Directions for administration via SMART pump:</p>	<p>Use emergency drug programme for administration</p>																														
<p><u>Prescribing</u></p>	<p>Example prescription for child 2 years and over - maintenance infusion:</p> <table border="1" data-bbox="320 786 1513 976"> <tr> <td>Drug</td> <td>Calcium gluconate 10% injection</td> <td>Drug amount in syringe</td> <td>9ml</td> <td>Diluent</td> <td>glucose 5%</td> <td>Total volume (ml)</td> <td>50ml</td> <td>Route</td> <td>IV</td> </tr> <tr> <td>Start date</td> <td>6/3/18</td> <td>Drug concentration per ml</td> <td>0.04mmol/ml</td> <td>Infusion range</td> <td>Dose/kg/time</td> <td>Min</td> <td>8.8mmol/24 hours</td> <td>Max</td> <td>Name, Sig, Bleep</td> </tr> <tr> <td>Pharm</td> <td></td> <td>mg / micrograms / units</td> <td></td> <td>ml/hr</td> <td></td> <td></td> <td>9.2</td> <td></td> <td>#1234</td> </tr> </table>	Drug	Calcium gluconate 10% injection	Drug amount in syringe	9ml	Diluent	glucose 5%	Total volume (ml)	50ml	Route	IV	Start date	6/3/18	Drug concentration per ml	0.04mmol/ml	Infusion range	Dose/kg/time	Min	8.8mmol/24 hours	Max	Name, Sig, Bleep	Pharm		mg / micrograms / units		ml/hr			9.2		#1234
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<p>Known compatibility issues</p>	<p>REFER TO SEPARATE GUIDELINE FOR COMPATIBILITY INFORMATION</p> <p><i>NB: Ceftriaxone incompatibility: Calcium gluconate and ceftriaxone must not be mixed or administered simultaneously, even via different infusion lines, because of risk of precipitation. However, in patients > 28 days, ceftriaxone and calcium gluconate may be administered sequentially, one after the other, if infusion lines at different sites are used or if the infusion line is flushed thoroughly or replaced between infusions.</i></p>																														
<p>Additional Comments:</p>	<ul style="list-style-type: none"> – Total calcium and ionised calcium levels should be closely monitored – Higher maintenance doses may be required in some cases. This should be discussed with a consultant first <p>Important safety information:</p> <ul style="list-style-type: none"> ❖ MHRA has advised that repeated or prolonged administration of calcium gluconate injection packaged in 10 mL glass containers is contra-indicated in children <18 years and in patients with renal impairment owing to risk of aluminium accumulation; in these patients use of calcium gluconate injection packaged in plastic containers is recommended. ❖ Adverse effects: Administer slowly to minimise peripheral vasodilation, cardiac depression, and circulatory collapse (possibly fatal). Rapid IV administration may also cause hypotension, bradycardia, cardiac arrhythmia, nausea, vomiting, flushing and sweating. 																														

Note: The contents of this monograph should be read in conjunction with information available in the BNFC and Medusa

References:

British National Formulary for Children, accessed online via www.medicinescomplete.com/ on 25.11.19

Derby Hospitals NHS Foundation Trust, Calcium Gluconate: NICU: Paediatric Clinical Guideline, Version 3, Ref. No: CH PH N 33
Leeds Teaching Hospital NHS Trust Neonatal Unit Administration Guide Calcium Gluconate accessed via <http://www.leedsformulary.nhs.uk/docs/NNU%20calcium%20gluconate%20monograph.pdf> on 25.11.19

Medusa Paediatric Intravenous Guide accessed via <http://medusa.wales.nhs.uk/IVGuideDisplay.asp> on 29.5.19

Document control sheet

GUIDELINE NUMBER	
AREA IN WHICH THIS MONOGRAPH APPLIES	Paediatrics

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AUTHORS		
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Changes Reference	Change details	Date
	Original split to give paediatrics and neonates a separate guideline.	November 2019