Queensland Ambulance Service

Department of Community Safety

Drug Therapy Protocols

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All feedback and suggestions are welcome,
please forward to **qascpm@dcs.qld.gov.au .**

CONTENTS

ABBREVIATIONS

ACP	Advanced Care Paramedic
ACS	Acute coronary syndrome
Adult	>12 years
AICD	Automated implantable Cardioverter Defibrillator
ALOC	Altered level of consciousness
ART	Arterial line (used for invasive pressure monitoring)
AMI	Acute myocardial infarction
amp	Ampoule
BGL	Blood glucose level
BP	Blood pressure
cap	Capsule
CF	Cystic Fibrosis
COAD	Chronic Obstructive Airway Disease
CVL	Central Venous Line
CPR	Cardio pulmonary resuscitation
ETT	Endo tracheal tube
FEV_1	Forced expiratory volume
FR	First Responder
g	Gram(s)
GI	Gastro-intestinal
hrs	Hours
ICD	Implantable cardioverter defibrillator
ICP	Intensive Care Paramedic
IM	Intramuscular
INH	Inhalation
IO	Intraosseous
ICP ESoR - Aeromedical	Intensive Care Paramedic Extended Scope of Role – Aeromedical (Authorised Officers & Skills Matrix available on the ESoR – Aeromedical DCS portal page)
inj	Injection
IV	Intravenous
IV Inf	Intravenous infusion
kg	Kilogram
KSAR	Known severe adverse reactions
L/min	Litres per min
LMA	Laryngeal Mask Airway
LWI	Local Work Instruction
MAP	Mean arterial pressure
Max	Maximum
mcg	Microgram(s)
mg	Milligram(s)
MAOIs	Monoamine Oxidase Inhibitors
mmol	Millimole
mL	Millilitre(s)
NAS	Intranasal
NC	Nasal cannulae
NEB	Nebulised
NSAIDs	Non steroidal anti inflammatory drugs
Paediatric	≤12 years
PCI	Percutaneous Coronary Intervention
PE	Pulmonary embolism
PEF	Peak expiratory flow
PO	Oral
prn	When required
P1	Paramedic

ABBREVIATIONS

P2	Advanced Skills Paramedic
SFM	Simple face mask
SpO_2	Oxygen saturations
STEMI	ST elevation myocardial infarction
subcut	Subcutaneous
subling	Sublingual
S2	Student year 2
S3	Student year 3
TCA	Tricyclic Antidepressant
TCP	Transcutaneous pacing
<	Less than
>	Greater than
≤	Less than or equal to
≥	Greater than or equal to

ADRENALINE

QAS Drug Class	**Schedule**
• Sympathomimetic	• 1mg/1mL (1:1 000) , S3 (Therapeutic poisons)[1] • 1mg/10mL (1:10 000), Unscheduled[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Amp, 1mg/1mL (1:1 000) *Adrenaline*[2] • Amp, 1mg/10mL (1:10 000) *Adrenaline*[2]	• **ACP** – NEB, IM & IV • **ICP** – NEB, IM, IV, IO & ETT • **ICP ESoR Aeromedical** – IV inf (QCC & road tasks)

Pharmacology

Adrenaline is a naturally occurring catecholamine which primarily acts on Alpha (α) and Beta (β) adrenergic receptors which are located mainly in the tissues innervated by sympathetic nerves. The actions of these receptors cause an increase in heart rate (β_1), increase in the force of myocardial contraction (β_1), increase in the irritability of the ventricles (β_1), bronchodilation (β_2) and peripheral vasoconstriction (α_1).

Metabolism

The majority of circulating Adrenaline is metabolised by sympathetic nerve endings. It is subject to the process of mitochondrial enzymatic breakdown by monoamine oxidase at the synaptic level.[3]

Onset	**Duration**	**Half Life (elimination)**
30 secs (IV) / 1 min (IM)	5 to 10 min (IM / IV)	2 min

Indications

- Anaphylaxis **OR** severe allergic reaction
- Severe life threatening bronchospasm **OR** silent chest (patients must either only be able to speak in single words **AND**/**OR** have haemodynamic compromise **AND**/**OR** an ALOC)
- Bradycardia with poor perfusion unresponsive to Atropine **AND**/**OR** TCP
- Cardiac arrest
- Croup with stridor at rest
- Shock (excluding haemorrhagic causes) that is unresponsive to adequate fluid resuscitation

Contraindications

- KSAR

Precautions

- Patients taking MAOIs
- Hypovolaemic shock
- Hypertension

Side Effects

- Anxiety
- Hypertension
- Palpitations/tachyarrhythmias
- Pupil dilation

Special notes:

1. Cardiac monitoring is required for all patients that have been administered Adrenaline.
2. 1:1 000 (1 mg/mL) Adrenaline presentation should be used for all nebuliser administration.
3. 1:10 000 (1 mg/10mL) or a 1:100 000 (100 mcg/10mL) Adrenaline preparation should be used for all low dose IV injections (eg. paediatric cardiac arrests) - ensure all syringes are appropriately labelled.[4]
4. Repeated IM injections to the same site may cause ischaemia and necrosis.[5-6]
5. High dose Adrenaline administration during cardiac arrest has shown not to improve outcome.[7]
6. Authorised officers should ensure, where possible, that Adrenaline is infused through an appropriately placed CVL.
7. Authorised officers should, where possible, utilise Invasive Pressure (IP) monitoring (ART) for patients receiving Adrenaline infusions.
8. Adrenaline infusions must be administered through a dedicated line.
9. Adrenaline is incompatible with the following QAS authorised IV medication – Sodium Bicarbonate 8.4%.[8]
10. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP

• Anaphylaxis **OR** severe allergic reaction		
IM	250 to 500mcg (0.25 to 0.5mg) Repeated at 5 min intervals - **no max dose**	
NEB	5mg – **single dose only** May be administered for isolated minor facial and/or tongue swelling thought to be allergic in origin - if stridor present IM Adrenaline must be administered	
• Severe life threatening bronchospasm **OR** silent chest (patients must either only be able to speak in single words **AND**/**OR** have haemodynamic compromise **AND**/**OR** an ALOC)		
IM	250 to 500mcg (0.25 to 0.5mg) Repeated at 5 min intervals - **no max dose**	
• Cardiac arrest		
IV	1mg Repeated at 3 to 5 min intervals - **no max dose**	

PAEDIATRIC DOSAGE – ACP

• Anaphylaxis **OR** severe allergic reaction		
IM	**≥10 kg (≥1 yr)**	10 mcg/kg – single dose not to exceed 250mcg (0.25mg) Repeated at 5 min intervals – **no max dose**
	<10 kg (<1yr)	100mcg Repeated at 5 min intervals – **no max dose**
NEB	5mg – **single dose only** May be administered for isolated minor facial and/or tongue swelling thought to be allergic in origin - if stridor present IM Adrenaline must be administered	
• Severe life threatening bronchospasm **OR** silent chest (patients must either only be able to speak in single words **AND**/**OR** have haemodynamic compromise **AND**/**OR** an ALOC)		
IM	10 mcg/kg – single dose not to exceed 250mcg (0.25mg) Repeated at 5 min intervals - **no max dose**	
• Cardiac arrest		
IV	**≥10 kg (≥1 yr)**	10 mcg/kg Repeated at 3 to 5 min intervals – **no max dose**
	<10 kg (<1yr)	100mcg Repeated at 3 to 5 min intervals – **no max dose**
• Croup with stridor at rest		
NEB	5mg – **single dose only**	

ADULT DOSAGE – ICP	
• Anaphylaxis **OR** severe allergic reaction	
IM	250 to 500mcg (0.25 to 0.5mg) Repeated at 5 min intervals - **no max dose**
IV / IO	20 to 50mcg (0.02 to 0.05mg) Repeated at 1 min intervals – **no max dose**
NEB	5mg – **single dose only** May be administered for isolated minor facial and/or tongue swelling thought to be allergic in origin - if stridor present IM and/or IV Adrenaline must be administered
ETT	**NOT APPROVED**
• Severe life threatening bronchospasm **OR** silent chest (patients must either only be able to speak in single words **AND/OR** have haemodynamic compromise **AND/OR** an ALOC)	
IM	250 to 500mcg (0.25 to 0.5mg) Repeated at 5 min intervals - **no max dose**
IV / IO	20 to 50mcg (0.02 to 0.05mg) Repeated at 1 min intervals – **no max dose**
ETT	**NOT APPROVED**
• Bradycardia with poor perfusion that is unresponsive to Atropine **AND/OR** TCP • Shock (excluding haemorrhagic causes) that is unresponsive to adequate fluid resuscitation	
IV / IO	20 to 50mcg (0.02 to 0.05mg) Repeated at 1 min intervals – **no max dose**
• Cardiac arrest	
IV / IO	1mg Repeated at 3 to 5 min intervals – **no max dose**
ETT	2mg - *(ETT dose = double IV dose)* Repeated at 3 to 5 min intervals – **no max dose**

PAEDIATRIC DOSAGE – ICP

• Anaphylaxis **OR** severe allergic reaction		
IM	**≥10 kg (≥1 yr)**	10 mcg/kg – single dose not to exceed 250mcg (0.25mg) Repeated at 5 min intervals – **no max dose**
	<10 kg (<1yr)	100mcg Repeated at 5 min intervals – **no max dose**
IV / IO	2 mcg/kg – single dose not to exceed 50mcg (0.05mg) Repeated at 2 min intervals - **no max dose**	
NEB	5mg – **single dose only** May be administered for isolated minor facial and/or tongue swelling thought to be allergic in origin – if stridor present IM and/or IV Adrenaline must be administered	
ETT	**NOT APPROVED**	
• Severe life threatening bronchospasm **OR** silent chest (patients must either only be able to speak in single words **AND/OR** have haemodynamic compromise **AND/OR** an ALOC)		
IM	10 mcg/kg – single dose not to exceed 250mcg (0.25mg) Repeated at 5 min intervals - **no max dose**	
IV / IO	2 mcg/kg – single dose not to exceed 50mcg (0.05mg) Repeated at 2 min intervals - **no max dose**	
ETT	**NOT APPROVED**	
• Cardiac arrest		
IV / IO	**≥10 kg (≥1 yr)**	10 mcg/kg Repeated at 3 to 5 min intervals – **no max dose**
	<10 kg (<1yr)	100mcg as a bolus Repeated at 3 to 5 min intervals – **no max dose**
ETT	100 mcg/kg – single dose not to exceed 2mg (adult dose) Repeated at 3 to 5 min intervals – **no max dose**	
• Croup with stridor at rest		
NEB	5mg – **single dose only**	
• Shock (excluding haemorrhagic causes) that is unresponsive to adequate fluid resuscitation		
IV / IO	2 mcg/kg – single dose not to exceed 50mcg (0.05mg) Repeated at 2 min intervals - **no max dose**	
• Bradycardia with poor perfusion that is unresponsive to Atropine **AND/OR** TCP		
NOT APPROVED (CONSULT REQUIRED)		

ADULT DOSAGE – ICP ESoR Aeromedical

• Shock (excluding haemorrhagic causes) that is unresponsive to adequate fluid resuscitation	
IV inf	Mix 3mg of 1:1 000 Adrenaline (3mL) with 47mL of Sodium Chloride 0.9% in a 50mL syringe to achieve a final concentration of 60 mcg/mL. Ensure all syringes are appropriately labelled.[4] Commence infusion at 2 mcg/min (2 mL/hr) and increase by 1 to 2 mcg/min (1 to 2 mL/hr) every 3 to 5 min as determined by MAP.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

QAS Drug Class	**Schedule**
• Anti-arrhythmic	• S4 (Restricted drugs)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Amp, 150mg/3mL *Amiodarone* (Cordarone X)[9]	• **ICP** – IV & IO • **ICP ESoR Aeromedical** – IV inf (QCC tasks only)

Pharmacology

Amiodarone prolongs the duration of the action potential and therefore the refractory period of atrial, nodal and ventricular tissues. It also reduces conduction across all cardiac tissue – including myocardial and conducting system cells. Amiodarone demonstrates electrophysiological properties across all Vaughan – Williams Class groups, which enables a broad spectrum of activity.[10]

Metabolism

The majority of the drug is excreted by the liver, there may be some hepatic recirculation.[10]

Onset (IV)	**Duration (IV)**	**Half Life (elimination)**
5 min	30 min	14 to 110 days (chronic dosing)

Indications

- Cardiac arrest patients with refractory ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT)[11]
- Critical care patients during interfacilty transfer (ESoR – Aeromedical only)

Contraindications

- Cardiac arrest patients with refractory VF or pulseless VT
  a. Nil
- Critical care patients during interfacilty transfer
  a. Known severe adverse reaction
  b. Bradycardia
  c. Severe conduction disorders (unless pacemaker or AICD insitu)
  d. Concomitant use of anti-arrhythmics that prolong the QT interval[12]
  e. Pregnancy and/or lactation

Precautions

- Cardiac arrest patients with refractory VF or pulseless VT
  a. Concomitant use of anti-arrhythmics that prolong the QT interval[12]
  b. Thyroid disease[13]
- Critical care patients during interfacilty transport
  a. Hypotension
  b. Thyroid disease[13]

Side Effects

- Hypotension
- Bradycardia
- Nausea and/or vomiting
- Peripheral paraesthesia

Special notes:

1. If patient is on oral Amiodarone, the below protocols continue to be authorised.
2. If Lignocaine 2% has been administered to a patient with conscious VT which progresses into cardiac arrest, the below protocols continue to be authorised.[11]
3. If the patient is in Torsade de Pointes due to suspected prolonged QT interval from excess Amiodarone administration Magnesium Sulphate administration is to be considered.[14]
4. Amiodarone is incompatible with the following QAS authorised IV fluids/medications – Sodium Chloride 0.9% (*see special notes # 5*), Frusemide, Heparin and Sodium Bicarbonate 8.4%.[8]
5. After completion of a risk/benefit analysis, the QAS authorises the administration of Sodium Chloride 0.9% (flush or running IV line) following Amiodarone in cardiac arrest despite manufacturer's recommendations.[15]

ADULT DOSAGE – ICP

- Cardiac arrest patients with refractory VF or pulseless VT

IV / IO	300mg (undiluted) - slow push over 2 min Repeated once at 150mg after 5 min – **total max dose 450mg**

PAEDIATRIC DOSAGE – ICP

- Cardiac arrest patients with refractory VF or pulseless VT

IV / IO	5 mg/kg - slow push over 2 min – **single dose only** * Mix 150mg (3mL) of Amiodarone with 12mL of Glucose 10% (totalling 15mL) in a 20mL syringe to achieve a final concentration of 10mg/mL

ADULT DOSAGE – ICP ESoR Aeromedical

- Critical care patients during interfacilty transfer (ESoR – Aeromedical only)

IV inf	***QCC consultation and approval required in all situations*** ICP ESoR – Aeromedical officers will continue Amiodarone infusions already commenced at hospital, using the same concentration and administration rate already preset. This may involve withdrawing previously mixed and labelled solutions from the referring hospital. Should the QCC Medical Coordinator request an Amiodarone infusion be commenced, the following procedure is to be undertaken. **IV inf (loading dose)** - Mix 300mg (6mL) of Amiodarone with 44mL of Glucose 5% or Glucose 10% in a 50mL syringe to achieve a final concentration of 6 mg/mL. Administer via syringe driver at a rate of 100 mL/hr (over 30 min). Ensure all syringes are appropriately labelled.[4] **IV inf (maintenance dose to be administered immediately following loading dose) -** Mix 150mg (3mL) of Amiodarone with 47mL of Glucose 5% or Glucose 10% in a 50mL syringe to achieve a final concentration of 3 mg/mL. Administer via syringe driver at rate of 12.5 mL/hr. Ensure all syringes are appropriately labelled.[4] Maintenance infusion is to continue for a period of 24 hrs with a total of 900mg Amiodarone administered.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

QAS Drug Class	**Schedule**
• Antiplatelet	• S2 (Therapeutic poisons)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Tab (white), 300mg *Aspirin*	• **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** - PO

Pharmacology
Aspirin inhibits platelet aggregation by irreversibly inhibiting cyclo-oxygenase, reducing the synthesis of thromboxane A_2 (an inducer of platelet aggregation) for the life of the platelet. This action forms the basis of preventing platelets from aggregating to exposed collagen fibres at the site of vascular injury.

Metabolism
Converted to salicyclic acid in many tissues, but primarily in the GI mucosa and liver, excreted by the kidneys.

Onset (PO)	**Duration (PO)**	**Half Life (elimination)**
~10 min (variable)	7 to 10 days (antiplatelet)	3.2 hrs (300 to 650 mg)

Indications
- Suspected AMI **OR** myocardial ischaemia[16-17]

Contraindications
- KSAR to Aspirin or NSAIDs
- Chest pain associated with psychostimulant overdose[18]
- Bleeding disorders
- Current GI bleeding or peptic ulcers
- Patients <18 yrs

Precautions
- Possible aortic aneurysm or other condition that may require surgery[19]
- Pregnancy
- History of GI bleeding or peptic ulcers
- Concomitant anticoagulant therapy (excluding Clopidogrel)

Side Effects
- Epigastric pain/discomfort
- Nausea and/or vomiting
- Gastritis
- GI bleeding[20]
- NSAID induced bronchospasm[21]

Special notes:
1. In suspected AMI or myocardial ischaemia Aspirin should be administered following the initial dose of Glyceryl Trinitrate (if indicated).
2. Aspirin administration is indicated for patients with suspected AMI or myocardial ischaemia even if pain free.
3. Patients who have had <300mg Aspirin in the previous 24 hrs and who present with suspected AMI or myocardial ischaemia should be administered a dose of Aspirin that equates to a total daily dose of 300 to 450mg.

ADULT DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

- Suspected AMI **OR** myocardial ischaemia

PO	**≥18 yrs**	300mg – chewed and followed by small sip water (where possible)
	<18 yrs	**NOT APPROVED**

PAEDIATRIC DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

NOT APPROVED

QAS Drug Class • Antichloinergic (antimuscarinic)	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 1.2 mg/1mL *Atropine*	**QAS Authorised Routes of Administration** • **ECP** – IM & IV • **ICP** – IM, IV, IO & ETT • **ICP ESoR Aeromedical** – IV inf (QCC tasks only)

Pharmacolgy
Atropine works by inhibiting the action of the parasympathetic nervous system allowing for an unchallenged sympathetic response. It successfully blocks the action of the vagus nerve on the heart, increases the rate of the SA node and conduction through the AV node and blocks exocrine gland activity causing decreased salivary, bronchial, gastric and sweat secretion.

Metabolism
Metabolised by the liver and excreted mainly by the kidneys.

Onset (IV)	Duration (IV)	Half Life (elimination)
1 to 2 min (peak 15 to 50 min)[10]	Up to 5 hrs[10]	3 to 4 hrs

Indications
- Bradycardia with poor perfusion
- Envenomation associated with increased parasympathetic activity (eg. airway secretions or bradycardia)
- Hypersalivation associated with Ketamine administration
- Organophosphate toxicity with cardiac **AND**/**OR** respiratory compromise (eg. profuse oral and/or bronchial secretions)

Contraindications
- KSAR

Precautions
- Atrial flutter and atrial fibrillation
- AMI (so as to not excessively increase myocardial workload)
- Glaucoma

Side Effects
- Agitation/hallucinations
- Dilated pupils
- Dry mouth/dry skin
- Tachycardia

Special notes

1. A dose of up to 1.2mg of Atropine is generally sufficient for bradycardia in adult patients, subsequent doses in patients who fail to respond is not usually beneficial.[22]
2. Small doses of Atropine may cause paradoxical bradycardia.[23]
3. Atropine requirements for organophosphate toxicity vary enormously between patients and organophosphates.[24]
4. Target atropinisation for organophosphate toxicity is achieved when at least 4 end points are attained (including all of the first 3). End points include:
    a. chest clear and no wheeze on auscultation;
    b. heart rate >80 beats per minute;
    c. systolic BP >80 mmHg;
    d. pupils no longer constricted; and
    e. dry axillae
5. Organophosphate toxicity induced tachycardia should not prohibit Atropine administration if respiratory distress is present (eg. profuse oral and/or bronchial secretions).
6. Total loading dose (ESoR Aeromedical IV infusion protocol) is defined as the sum of the initial doses given at the beginning of a course of treatment prior to administering a lower maintenance dose.
7. Atropine is incompatible with the following QAS authorised IV medications – Adrenaline, Heparin & Sodium Bicarbonate 8.4%.[8]
8. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ECP	
• Organophosphate toxicity with cardiac **AND/OR** respiratory compromise (eg. profuse oral and/or bronchial secretions) • Envenomation associated with increased parasympathetic activity (eg. airway secretions or bradycardia)	
IM / IV	***Appropriate Medical Officer consultation and approval required in all situations*** 1.2mg Repeated every 5 min until Atropinisation *(see special notes # 4)* is achieved – **no max dose**
PAEDIATRIC DOSAGE – ECP	
• Organophosphate toxicity with cardiac **AND/OR** respiratory compromise (eg. profuse oral and/or bronchial secretions) • Envenomation associated with increased parasympathetic activity (eg. airway secretions or bradycardia)	
IM / IV	***Appropriate Medical Officer consultation and approval required in all situations*** 20 mcg/kg - single dose not to exceed 600mcg Repeated every 5 min until Atropinisation *(see special notes # 4)* is achieved – **no max dose**

ADULT DOSAGE – ICP	
• Bradycardia with poor perfusion	
IV / IO	600mcg (0.6mg) Repeated once after 2 min – **total max dose 1.2mg**
ETT	1.2mg – *(ETT = double IV dose)* Repeated once after 2 min – **total max dose 2.4mg**
• Organophosphate toxicity with cardiac **AND/OR** respiratory compromise (eg. profuse oral and/or bronchial secretions) • Envenomation associated with increased parasympathetic activity (eg. airway secretions or bradycardia)	
IM / IV / IO	1.2mg Repeated every 5 min until Atropinisation *(see special notes # 4)* is achieved – **no max dose**
ETT	**NOT APPROVED**
• Hypersalivation associated with Ketamine administration	
IV	600mcg – **single dose only**
PAEDIATRIC DOSAGE – ICP	
• Bradycardia with poor perfusion	
IV / IO	20 mcg/kg – single dose not to exceed 600mcg Repeated once after 2 min – **total max dose 40 mcg/kg**
ETT	**NOT APPROVED**
• Organophosphate toxicity with cardiac **AND/OR** respiratory compromise (eg. profuse oral and/or bronchial secretions) • Envenomation associated with increased parasympathetic activity (eg. airway secretions or bradycardia)	
IM / IV / IO	20 mcg/kg – single dose not to exceed 600mcg Repeated every 5 min until Atropinisation *(see special notes # 4)* is achieved – **no max dose**
ETT	**NOT APPROVED**
• Hypersalivation associated with Ketamine administration	
IV	20 mcg/kg – **not to exceed 600mcg – single dose only**

ADULT DOSAGE – ICP ESoR Aeromedical

- Organophosphate toxicity with cardiac **AND/OR** respiratory compromise (eg. profuse oral and/or bronchial secretions)

IV inf	***QCC consultation and approval required in all situations*** Mix the **total loading dose** *(see special notes # 6)* of Atropine with Sodium Chloride 0.9% to make up a total volume of 50mL. Ensure all syringes are appropriately labelled.[4] Administer at 5 to 10 mL/hr (10 to 20% of loading dose/hr) to maintain Atropinisation.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

BENZTROPINE

QAS Drug Class • Anticholinergic	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 2.0mg/2mL *Benztropine* (Cogentin®)[25]	**QAS Authorised Routes of Administration** • ICP – IM & IV

Pharmacology
Benztropine is a synthetic compound resulting from the combining of Atropine and diphenhydramine which possesses both anticholinergic and antihistamine actions. It counteracts the unopposed activity of acetylcholine which causes excessive muscle stimulation, resulting in dystonic reactions.

Metabolism
Hepatic.

Onset (IV)	Duration (IV)	Half Life (elimination)
1 to 2 mins	1 to 2 hrs	~16 hrs

Indications
- Acute dystonic reaction

Contraindications
- KSAR
- Tardive Dyskinesia
- Children <3 yrs

Precautions
- Sedative effects of other drugs may be enhanced
- Children <12 yrs

Side Effects
- Dilated pupils
- Dry mouth
- Nausea and/or vomiting
- Tachycardia
- Toxic psychosis including confusion and visual hallucinations
- Urinary retention and/or dysuria

Special notes:

1. Because of its Atropine like side effects, Benztropine is contraindicated in children <3 yrs and should be used with caution in older children.[10]
2. There is no significant difference in the onset of effect following IV or IM injection.[8, 26]

ADULT DOSAGE – ICP

• Acute dystonic reaction	
IM / IV	1 to 2mg – **single dose only**

PAEDIATRIC DOSAGE – ICP

• Acute dystonic reaction		
IM / IV	**≥3 yrs**	20 mcg/kg - **single dose only**
	<3 yrs	**NOT APPROVED**

BOX JELLYFISH ANTIVENOM

QAS Drug Class • Antivenom	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 20 000 units *Box Jellyfish Antivenom* [27,28]	**QAS Authorised Routes of Administration** • **S3** / **P1** / **P2** - IM • **ACP** / **ICP** – IM & IV

Pharmacology
Box Jellyfish antivenom contains concentrated immunoglobulin that acts to neutralise the toxins present in the venom of the Box Jellyfish *(Chironex fleckeri).*

Metabolism
In muscle tissue and the liver.

Onset	Duration	Half Life
Not available	Not available	Not available

Indications
- Box Jellyfish envenomation associated with any of the following:
  a. Cardiac arrest
  b. Decreased level of consciousness
  c. Cardiac **AND**/**OR** respiratory distress or collapse
  d. Total surface area affected greater than half the surface area of one limb
  e. Intractable pain unrelieved by icepacks, Methoxyflurane **AND**/**OR** Morphine

Contraindications
- KSAR

Precautions
- The antivenom is a foreign protein which can cause sensitisation, allergic reaction or anaphylaxis

Side Effects
- Allergic reaction including anaphylactic shock and delayed serum sickness (≥1/100)[27]
- Intense stinging sensation on injection

Special notes:

1. If a patient is in cardiac arrest due to Box Jellyfish envenomation, ACPs & ICPs are to administer Box Jellyfish Antivenom only after the commencement of effective CPR, advanced life support measures and administration of cardioactive drugs.[27]
2. The dose of Antivenom is related to the dose of venom, not based on the size of the patient.[10]
3. Box Jellyfish Antivenom must be protected from light and stored between 2 to 8°C – DO NOT FREEZE.[27]
4. A calculated IM volume of > 2mL is required to be administered at different IM sites via separate syringes.
5. At all times during antivenom therapy Adrenaline must be available in case of an anaphylactic reaction. Should an anaphylactic reaction occur, immediately cease the administration of Box Jellyfish Antivenom and treat patient in accordance with the QAS Clinical Practice Guidelines.
6. IV injection is the preferred route of administration for all indications. Recent evidence has demonstrated that IM antivenom does not reach the systemic circulation within hours in patients with haemodynamic compromise.[14]
7. Although Box Jellyfish Antivenom remains the recommended treatment for Box Jellyfish envenomation[14] there is recent evidence suggesting the administration of Box Jellyfish antivenom is unlikely to be clinically effective because of the delay in administration.[29-30]

ADULT & PAEDIATRIC DOSAGE – S3 / P1 / P2

• Box Jellyfish envenomation associated with any of the following: a. Decreased level of consciousness b. Cardiac **AND/OR** respiratory distress or collapse c. Total surface area affected greater than half the surface area of one limb d. Intractable pain unrelieved by icepacks, Methoxyflurane **AND/OR** Morphine	
IM	60 000 units **– single dose only**

ADULT & PAEDIATRIC DOSAGE – ACP / ICP

• Box Jellyfish envenomation associated with any of the following: a. Decreased level of consciousness b. Cardiac **AND/OR** respiratory distress or collapse c. Total surface area affected greater than half the surface area of one limb d. Intractable pain unrelieved by icepacks, Methoxyflurane **AND/OR** Morphine	
IM	60 000 units **– single dose only**
IV	20 000 units drawn up to 20mL of Sodium Chloride 0.9% and given by slow IV push (over 10 min) **– single dose only**
• Box Jellyfish envenomation associated with cardiac arrest	
IM	**NOT AUTHORISED**
IV	20 000 units drawn up to 20mL of Sodium Chloride 0.9% and given by slow IV push (over 2 to 5 min), repeated immediately up to 2 times (total max dose 60 000 units)

CALCIUM GLUCONATE 10%

QAS Drug Class	**Schedule**
• Electrolyte	• Unscheduled[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Amp, 0.953g/10mL *Calcium Gluconate 10%*[31]	• ICP – IV & IO

Pharmacology

Calcium Gluconate 10% plays an integral role in the muscular and neural systems. It is involved in skeletal muscle contraction, excitation coupling in cardiac and smooth muscle and acts as an intracellular 2nd messenger. These effects combine to exert a positive inotropic effect in the post cardiac arrest patient.[32]

Metabolism

Most of the calcium filtered by the renal glomeruli is reabsorbed, the remainder is excreted in faeces.

Onset (IV)	**Duration (IV)**	**Half Life (elimination)**
1 to 3 mins[33]	30 to 60 mins[33] (in hyperkalaemia)	Not applicable

Indications

- Cardiac arrest where the underlying aetiology is likely to be hyperkalaemia
- Severe hyperkalaemia with haemodynamic compromise **OR** significant cardiac rhythm disturbance
- Calcium channel blocker toxicity
- Hypotension associated with a Magnesium infusion that fails to respond to intravenous fluid therapy

Contraindications

- KSAR
- Digoxin (Digitalis) overdose

Precautions

- Respiratory acidosis

Side Effects

- Cardiac arrest where the underlying aetiology is likely to be hyperkalaemia
  a. Nil
- For all other QAS indications rapid IV administration may cause:
  a. Syncope
  b. Hypotension
  c. Bradycardia
  d. Cardiac dysrhythmias
  e. Cardiac arrest

Special notes:

1. Avoid extravasation, all administrations are to be injected slowly (over 2 to 5 mins) into a large vein.[26]
2. Calcium Gluconate 10% is incompatible with the following QAS authorised IV medications – Metoclopramide and Sodium Bicarbonate 8.4%.[8]
3. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP

- Cardiac arrest where the underlying aetiology is likely to be hyperkalaemia
- Severe hyperkalaemia with haemodynamic compromise **OR** significant cardiac rhythm disturbance
- Calcium channel blocker toxicity
- Hypotension associated with a Magnesium infusion that fails to respond to intravenous fluid therapy

IV / IO	10mL of 10% - slow push over 2 to 5 min Repeated once at 10 min

PAEDIATRIC DOSAGE – ICP

- Cardiac arrest where the underlying aetiology is likely to be hyperkalaemia
- Severe hyperkalaemia with haemodynamic compromise **OR** significant cardiac rhythm disturbance
- Calcium channel blocker toxicity
- Hypotension associated with a Magnesium infusion that fails to respond to intravenous fluid therapy

IV / IO	0.2 mL/kg of 10% - slow push over 2 to 5 min Repeated once at 10 min

QAS Drug Class • Antibiotic (third generation cephalosporin)	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Vial (powder), 1g *Ceftriaxone* (Rocephin)[34]	**QAS Authorised Routes of Administration** • **ACP** – IM & IV • **ICP** – IM, IV & IO[35]

Pharmacology
Ceftriaxone is a third generation broad spectrum cephalosporin antibiotic used in the treatment of meningococcal infections.

Metabolism
Variable hepatic metabolism, significant amounts excreted unchanged in urine.

Onset	Duration	Half Life (elimination)
Dose/route variable	~1 day	5.8 to 8.7 hrs (healthy subjects)

Indications
- Suspected meningococcal septicaemia with non-blanching petechial **OR** purpuric rash and other significant symptoms that may include:
  a. myalgia;
  b. headache;
  c. nausea and/or vomiting;
  d. severe lethargy;
  e. fever; or
  f. clinical evidence of shock.

Contraindications
- KSAR to cephalosporin drugs
- Known anaphylaxis or severe allergic reaction to penicillin based drugs - (isolated minor drug rash attributed to penicillin does not contraindicate the use of Ceftriaxone)[22]

Precautions
- Nil

Side Effects
- Nausea/vomiting
- Pain at the IM administration site

Special notes:

1. A calculated IM volume of >2mL is required to be administered at different IM sites via separate syringes.
2. Ceftriaxone is incompatible with the following QAS authorised IV medication – Calcium Gloconate 10%.[8]
3. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP

- Suspected meningococcal septicaemia with non-blanching petechial **OR** purpuric rash and other significant symptoms that may include:
  a. myalgia;
  b. headache;
  c. nausea and/or vomiting;
  d. severe lethargy;
  e. fever; or
  f. clinical evidence of shock.

IM	1g * Reconstitute 1gm with 3.6mL of Water for Injection to achieve a final concentration of 1g/4mL (250mg/mL).
IV	1g slow push over 3 to 5 min * Reconstitute 1gm with 9.6mL of Water for Injection in a 10mL syringe to achieve a final concentration of 1g/10mL (100 mg/mL).

PAEDIATRIC DOSAGE – ACP

- Suspected meningococcal septicaemia with non-blanching petechial **OR** purpuric rash and other significant symptoms that may include:
  a. myalgia;
  b. headache;
  c. nausea and/or vomiting;
  d. severe lethargy;
  e. fever; or
  f. clinical evidence of shock.

IM

50 mg/kg (rounded up to the nearest 5kg)

* Reconstitute 1g of Ceftriaxone with 3.6mL of Water for Injection to achieve a final concentration of 1g/4mL (250mg/mL).

Weight (kg)	Dose (mg)	Vol (mL)
<5kg	250mg	1mL
5kg to 10kg	500mg	2mL
10kg to 15kg	750mg	3mL
>15kg	1g	4mL

IV

50 mg/kg (rounded up to the nearest 5kg) slow push over 3 to 5 min

* Reconstitute 1g of Ceftriaxone with 9.6mL of Water for Injection in a 10mL syringe to achieve a final concentration of 1g/10mL (100 mg/mL).

Weight (kg)	Dose (mg)	Vol (mL)
<5kg	250mg	2.5mL
5kg to 10kg	500mg	5mL
10kg to 15kg	750mg	7.5mL
>15kg	1g	10mL

ADULT DOSAGE – ICP

- Suspected meningococcal septicaemia with non-blanching petechial **OR** purpuric rash and other significant symptoms that may include:
  g. myalgia;
  h. headache;
  i. nausea and/or vomiting;
  j. severe lethargy;
  k. fever; or
  l. clinical evidence of shock.

IM

1g

* Reconstitute 1gm with 3.6mL of Water for Injection to achieve a final concentration of 1g/4mL (250mg/mL).

IV / IO

1g slow push over 3 to 5 min

* Reconstitute 1gm with 9.6mL of Water for Injection in a 10mL syringe to achieve a final concentration of 1g/10mL (100 mg/mL).

PAEDIATRIC DOSAGE – ICP

- Suspected meningococcal septicaemia with non-blanching petechial **OR** purpuric rash and other significant symptoms that may include:
  - g. myalgia;
  - h. headache;
  - i. nausea and/or vomiting;
  - j. severe lethargy;
  - k. fever; or
  - l. clinical evidence of shock.

IM

50 mg/kg (rounded up to the nearest 5kg)

* Reconstitute 1g of Ceftriaxone with 3.6mL of Water for Injection to achieve a final concentration of 1g/4mL (250mg/mL).

Weight (kg)	Dose (mg)	Vol (mL)
<5kg	250mg	1mL
5kg to 10kg	500mg	2mL
10kg to 15kg	750mg	3mL
>15kg	1g	4mL

IV / IO

50 mg/kg (rounded up to the nearest 5kg) slow push over 3 to 5 min

* Reconstitute 1g of Ceftriaxone with 9.6mL of Water for Injection in a 10mL syringe to achieve a final concentration of 1g/10mL (100 mg/mL).

Weight (kg)	Dose (mg)	Vol (mL)
<5kg	250mg	2.5mL
5kg to 10kg	500mg	5mL
10kg to 15kg	750mg	7.5mL
>15kg	1g	10mL

CLOPIDOGREL

QAS Drug Class • Antiplatelet	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Tab (pink), 75mg, *Clopidogrel* (Iscover)[36]	**QAS Authorised Routes of Administration** • ICP – PO

Pharmacology
Clopidogrel is a specific and potent platelet aggregation inhibitor. It selectively inhibits the binding of adenosine diphosphate (ADP) to its platelet receptor thereby inhibiting platelet aggregation.[10]

Metabolism
Hepatic.

Onset (PO)	Duration (PO)	Half Life (elimination)
~30 min (within 5 hrs of a 300mg loading dose 80% platelet will be inhibited[37])	7 to 10 days (antiplatlet)	8 hrs

Indications
- For patients with STEMI (as defined in the QAS Coronary Artery Reperfusion Checklist) **AND**:
  a. Who have been **accepted for acute PCI** (as an adjunct medication to Aspirin and Heparin)[38] **OR**
  b. Who have **received fibrinolytic therapy** (as an adjunct medication to Aspirin, Enoxaparin and Tenecteplase)[39]

Contraindications
- Identical to the contraindication list for prehospital fibrinolysis and anticoagulation, unless specifically authorised under the relevant LWI (refer to QAS Coronary Artery Reperfusion Checklist and LWI)
- KSAR
- Patients currently taking Clopidogrel *(see special notes # 2)*
- Patients <18 yrs

Precautions
- Severe renal impairment

Side effects
- Haemorrhage
- Stomach upset and/or pain
- Diarrhoea
- Constipation
- Headache and/or dizziness

Special notes:
1. Clopidogrel is not to be given in isolation. If Heparin or Enoxaparin is contraindicated then Clopidogrel is also contraindicated.
2. If the patient is on their own Clopidogrel (eg. Plavix® or Iscover®) medication, there is no requirement for a loading dose.

ADULT DOSAGE – ICP

• Patients with STEMI (as defined by the QAS Coronary Artery Reperfusion checklist) and who have been **accepted for acute PCI** (and have been administered Aspirin and Heparin)		
PO	**≥18 yrs**	600mg – swallowed with a small quantity of water
	<18 yrs	**NOT APPROVED**
• Patients with STEMI (as defined by the QAS Coronary Artery Reperfusion checklist) and who have **received fibrinolytic therapy** (and have been administered Aspirin, Enoxaparin and Tenecteplase)		
PO	**≥18 yrs**	300mg – swallowed with a small quantity of water
	<18 yrs	**NOT APPROVED**

PAEDIATRIC DOSAGE – ICP

NOT APPROVED

QAS Drug Class • Anticoagulant	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 40mg/0.4mL *Enoxaparin Sodium* (Clexane)[40] • Inj (prefilled syringe with graduated markings) 100mg/1mL *Enoxaparin Sodium* (Clexane)[40]	**QAS Authorised Routes of Administration** • **ICP** – subcut & IV

Pharmacology
Enoxaparin sodium has several actions on the coagulation pathway through its binding to antithrombin III. The antithrombotic activity is related to inhibition of thrombin generation and inhibition of two key coagulation factors: factor Xa and thrombin.

Metabolism
Limited metabolism at the liver but mostly eliminated unchanged.

Onset (IV)	Duration (IV)	Half Life (elimination)
Immediate (peak 3 hrs)	12 to 24 hrs	4.4 hrs for 40mg dose

Indications
- Patients with STEMI (as defined in the QAS Coronary Artery Reperfusion Checklist) **AND** who will receive **QAS fibrinolytic therapy** (as an adjunct medication to Aspirin, Clopidogrel and Tenecteplase)[41]

Contra-indications
- KSAR to Enoxaparin or Heparin
- Identical to the contraindication list for prehospital fibrinolysis, unless specifically authorised under the relevant LWI (see Tenecteplase DTP and QAS Coronary Artery Reperfusion Check List)

Precautions
- Renal/hepatic impairment
- History of GI ulceration
- Diabetic retinopathy
- Low bodyweight (<45 kg women and <57 kg men)[10]
- Elderly
- Pregnancy and/or lactation

Side Effects
- Thrombocytopenia
- Haemorrhage

Special notes

1. For all IV administrations an Enoxaparin 40mg/0.4mL ampoule is to be used.
2. For all subcut administrations an Enoxaparin 100mg/1mL graduated prefilled syringe is to be used. The volume to be injected should be measured precisely according to the dosage recommended – the air bubble is not to be expelled while adjusting the dose. If the dose required is exactly 100mg inject the full contents of the syringe. The whole length of the needle should be introduced vertically (at 90° angle to the skin) into the thickness of the skin fold gently held between the Paramedic's thumb and finger. This skin fold should be held throughout the duration of the injection.[40] Subcutaneous injection sites are not to be rubbed or massaged following administration.[26]
3. IV Enoxaparin should be administered through an IV line and should not be coadministered with other medications.

ADULT DOSAGE – ICP

- Patients with STEMI (as defined in the QAS Coronary Artery Reperfusion Checklist) **AND** who will receive **QAS fibrinolytic therapy** (as an adjunct medication to Aspirin, Clopidogrel and Tenecteplase)

IV	30mg (loading dose – to be administered prior to Tenecteplase) * Mix 40mg (0.4mL) of Enoxaparin with 3.6mL Sodium Chloride 0.9% (totalling 4mL) in a 5 mL syringe to achieve a final concentration of 10mg/mL. Discard 1mL of the prepared solution to achieve a final presentation of 30mg/3mL. **Subcutaneous injection dose (listed below) is to be administered 15 mins following IV Enoxaparin loading dose.**
subcut	1mg/kg (max dose 100mg) – to be administered 15 min following loading dose (listed above) – (see special notes # 2)

PAEDIATRIC DOSAGE – ICP

NOT APPROVED

QAS Drug Class • Loop diuretic	**Schedule** • S4 (Restricted drugs) [1]
QAS Presentation • Amp, 20mg/2mL *Frusemide* (Lasix)	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV inf (QCC tasks only)

Pharmacology
Frusemide is a potent loop diuretic that acts by inhibiting sodium and chloride absorption in the ascending loop of Henle (proximal and distal tubules). Frusemide has no significant pharmacological effects other than on renal function.

Metabolism
The majority of parenteral Frusemide is excreted in the urine within 24 hrs, the remainder is excreted in faeces.

Onset (IV inf)	Duration	Half Life (elimination)
3 to 5 min (peak 30 min)	~2 hrs (following stat IV dose)	100 min

Indications
- Congestive cardiac failure
- Fluid overload with compromised renal function
- Oliguria after correction of hypotension and hypovolaemia
- Critical care patients during interfacility transport (ESoR – Aeromedical only)

Contraindications
- KSAR
- Prehospital use in acute cardiogenic pulmonary oedema

Precautions
- Hypotension

Side effects
- Marked diuresis can lead to hypotension
- Potassium loss associated with diuresis may aggravate or potentiate dysrhythmias

Special notes:

1. Frusemide has been removed from QAS prehospital use in acute cardiogenic pulmonary oedema. This is due to the absence of supporting clinical evidence. [42-45]
2. Increased infusion doses may be required in patients with chronic renal impairment and/or who take regular high dose oral Frusemide.
3. Frusemide is incompatible with the following QAS authorised IV medications – Amiodarone, Isoprenaline, Metoclopramide, Midazolam, Morphine, Ondansetron & Promethazine.[8]
4. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP ESoR Aeromedical

- Congestive cardiac failure
- Fluid overload with compromised renal function
- Oliguria after correction of hypotension and hypovolaemia
- Critical care patients during interfacility transport (ESoR – Aeromedical only)

IV inf	***QCC consultation and approval required in all situations*** ICP ESoR – Aeromedical officers will continue Frusemide infusions already commenced at hospital, using the same concentration and administration rate already preset. Should the QCC Medical Coordinator request a Frusemide infusion be commenced, the following procedure is to be undertaken. Mix 100mg (10mL) of Frusemide with 40mL of Sodium Chloride 0.9% in a 50mL syringe to achieve a final concentration of 2mg/mL. Ensure all syringes are appropriately labelled.[4] Commence infusion at 2 to 20 mg/hr (1 to 10 ml/hr), until the desired urine output is achieved.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

GLUCAGON

QAS Drug Class • Glucose regulatory hormone	**Schedule** • S3 (Therapeutic poisons)[1]
QAS Presentation • Vials (powder & solvent), 1mg *Glucagon* (GlucaGen®Hypokit)[46]	**QAS Authorised Routes of Administration** • **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** - IM

Pharmacology
Glucagon is a hyperglycaemic agent that mobilises hepatic glycogen, which is released into the blood as glucose.

Metabolised
By the liver, kidneys and in the plasma.

Onset (IM)	Duration (IM)	Half life (elimination)
4 to 7 min	variable	3 to 6 min

Indications
- Suspected or known hypoglycaemia in patients unable to self administer oral glucose

Contra-indications
- KSAR

Precautions
- Nil

Side effects
- Nil

Special notes:

1. Glucagon may be ineffective in patients lacking stored glycogen (eg. alcoholic patients with impaired liver function).
2. The administration of Glucagon for hypoglycaemia is calculated on body weight not age.[46]
3. Oral carbohydrates should be given when the patient has responded to Glucagon treatment to restore liver glycogen and to prevent secondary hypoglycaemia.[26]
4. IM Glucagon should only be administered if IV Glucose 10% is unable to be administered in a suitable time frame.
5. Although no high quality evidence exists it is clear that IV Glucose works faster than IM Glucagon once the treatment has been administered.[47]
6. The Glucagon powder should be protected from light.[46]

ADULT DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

- Suspected or known hypoglycaemia in patients unable to self administer oral glucose

IM	1mg – **single dose only**

PAEDIATRIC DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

- Suspected or known hypoglycaemia in patients unable to self administer oral glucose

IM	**>25 kg**	1mg - **single dose only**
	≤25 kg	0.5mg - **single dose only**

GLUCOSE 5%

QAS Drug Class • Isotonic crystalloid solution	**Schedule** • Unscheduled [1]
QAS Presentation • Viaflex plastic container, 100mL, *Glucose 5%*	**QAS Authorised Routes of Administration** • **ICP ESoR - Aeromedical** – IV inf

Pharmacology Glucose is a sugar that is naturally in body fluids.		
Metabolism Broken down in most tissues and distributed throughout total body water.		
Onset Not applicable	**Duration** Not applicable	**Half Life** Not applicable
Indications • As a vehicle for drug delivery during IV drug infusion administration (ESoR – Aeromedical only)		
Contraindications • Nil		
Precautions • Hyperglycaemia		
Side Effects • Nil		

Special notes:

1. Glucose 5% 100mL viaflex plastic containers are not available via DCS stores. ESoR – Aeromedical stations are to procure all supplies from the QAS Medical Directors Office.

ADULT DOSAGE – ICP ESoR Aeromedical	
• As a vehicle for drug delivery during IV drug infusion administration (ESoR – Aeromedical only)	
IV inf	As documented on QAS DTPs
PAEDIATRIC DOSAGE – ICP ESoR Aeromedical	
• As a vehicle for drug delivery during IV drug infusion administration (ESoR – Aeromedical only)	
IV inf	As documented on QAS DTPs

GLUCOSE 10%

QAS Drug Class • Hypertonic crystalloid solution	**Schedule** • Unscheduled [1]
QAS Presentation • Viaflex plastic container, 500mL *Glucose 10%*	**QAS Authorised Routes of Administration** • **ACP** – IV inf • **ICP** – IV inf & IO inf

Pharmacology
Glucose 10% is a hypertonic crystalloid solution that provides the principal energy source for body cells, especially the brain.

Metabolism
Broken down in most tissues, stored in the liver and muscle as glycogen and distributed throughout total body water.

Onset (IV inf)	Duration (IV inf)	Half life (elimination)
Rapid	Not applicable	Not applicable

Indications
- Symptomatic hypoglycaemia with the inability to self administer oral glucose

Contra-indications
- Nil

Precautions
- Tissue and/or vascular necrosis secondary to extravasation
- Acute CVA

Side effects
- Nil

Special notes:

1. Glucose 10% is the preferred treatment for hypoglycaemia for patients unable to take oral glucose.[47] This is due to its rapid onset and ability to quickly restore blood glucose concentration to normal value.

ADULT DOSAGE – ACP

- Symptomatic hypoglycaemia with the inability to self administer oral glucose

IV inf	150mL Repeated at 100mL boluses every 5 min until BGL >4.0mmol

PAEDIATRIC DOSAGE – ACP

- Symptomatic hypoglycaemia with the inability to self administer oral glucose

IV inf	2.5 mL/kg Repeated at 1 mL/kg boluses every 5 min until BGL >4.0mmol

ADULT DOSAGE - ICP

- Symptomatic hypoglycaemia with the inability to self administer oral glucose

IV inf / IO	150mL Repeated at 100mL boluses every 5 min until BGL >4.0mmol

PAEDIATRIC DOSAGE - ICP

- Symptomatic hypoglycaemia with the inability to self administer oral glucose

IV inf / IO	2.5 mL/kg Repeated at 1 mL/kg boluses every 5 min until BGL >4.0mmol

QAS Drug Class • Hyperglycaemic		**Schedule** • Unscheduled [1]
QAS Presentation • Tube, 15g *Glucose* (Glutose 15™)[48]		**QAS Authorised Routes of Administration** • **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** - PO
Pharmacology Glucose gel is a form of pure glucose that is absorbed quickly in the intestinal tract after ingestion. In the liver glucose is turned into glycogen, the storage form of glucose in the body.		
Metabolism Metabolised in muscle and other tissue.		
Onset (PO) ~10 min	**Duration (PO)** Variable	**Half Life (elimination)** Not applicable
Indications • Symptomatic hypoglycaemia in the conscious patient		
Contraindications • KSAR • Unconsciousness • Patients with difficulty swallowing • Patients <2 yrs		
Precautions • Nil		
Side Effects • Nausea and/or vomiting • Diarrhoea		

Special notes:

1. Patients are to swallow the contents of the tube to achieve administration.

ADULT DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP	
• Symptomatic hypoglycaemia in the conscious patient	
PO	15g Repeated once at 15 mins if BGL ≤ 4mmol – **total max dose 30g**

PAEDIATRIC DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP		
• Symptomatic hypoglycaemia in the conscious patient		
PO	**≥2 yrs**	15g May be repeated once at 15 min if BGL ≤ 4mmol – **total max dose 30g**
	<2 yrs	**NOT APPROVED**

QAS Drug Class	**Schedule**
• Vasodilator	• SUBLING spray - S3 (Therapeutic poisons)[1] • 50mg/10mL amp - S4 (Restricted drugs)[1]
QAS Presentation • Spray (sublingual), 400mcg/dose, 200 doses, *Nitrolingual Pump Spray* • Amp, 50mg/10mL *Glyceryl Trinitrate*	**QAS Authorised Routes of Administration** • **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** – SUBLING • **ICP ESoR Aeromedical** – IV Inf (QCC/road tasks)

Pharmacology
GTN is a potent vasodilator that decreases preload by increasing venous capacity, pooling venous blood in the peripheral veins, reducing ventricular filling pressure and decreases arterial blood pressure (after load). Because of this cascade it also causes vasodilation in coronary arteries which are in spasm and may assist redistribution of blood flow along the collateral channels in the heart.

Metabolism
Readily absorbed and metabolised in the liver.

Onset (subling)	**Duration (subling)**	**Half Life (elimination)**
< 2 min	20 to 30 min[10]	5.5 min[10]

Indications
- Pain syndromes associated with suspected AMI **OR** myocardial ischaemia
- Cardiogenic pulmonary oedema
- Cardiac chest pain unresponsive to sublingual nitrates, narcotics **AND/OR** ßeta blockers (ESoR – Aeromedical only)
- Autonomic dysreflexia with a systolic BP ≥160 mmHg
- Irukandji envenomation syndrome[49] with a systolic BP ≥160 mmHg

Contraindications
- KSAR
- Heart rate <50 OR >150 beats per minute
- Systolic BP <100 mmHg
- Acute CVA
- Head trauma
- Erectile dysfunction medication in the previous 24 hrs[50]

Precautions
- Suspected inferior AMI
- Cerebral vascular disease
- Risk of hypotension and/or syncope
- Intoxication (GTN effects enhanced)
- Erectile dysfunction medication in the previous 4 days

Side Effects
- Dizziness
- Hypotension
- Syncope
- Reflex tachycardia
- Vascular headaches

Special notes:

1. Cardiac monitoring is required for all patients that have been administered GTN.
2. Patients with myocardial ischaemia should be administered an initial dose of sublingual GTN prior to Aspirin.
3. Autonomic Dysreflexia is a condition characterised by a massive sympathetic discharge that can occur in association with spinal cord injury or disease. GTN is the first line of treatment for this condition, however Morphine should be considered as part of the management regime if the patient is unresponsive to initial treatment.
4. Prepared GTN IV infusion solutions are stable in polypropylene syringes for 24 hours.[8]

5. Research has identified that GTN potency may be reduced due to the migration of GTN into certain administration sets. IV inf doses should be titrated according to patient response despite the container and giving set used.[26]
6. Some patients with normal or low left ventricular filling pressures or pulmonary capillary pressure may be hypersensitive to the effects of GTN and may respond to IV infusion doses from 5 mcg/min.
7. ESoR Aeromedical officer are to display extreme caution when ceasing GTN infusions due to potential of rebound symptoms.[22]
8. 50mg/10mL GTN ampoules are not available via DCS stores. ESoR – Aeromedical stations are to procure all supplies from the QAS Medical Director's Office.
9. IV GTN is incompatible with the following QAS authorised IV medication – Phenytoin.[8]
10. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – S2 / S3	
• Pain syndromes associated with suspected AMI **OR** myocardial ischaemia	
SUBLING	400mcg Repeated at 5 min intervals whilst symptoms continue and systolic BP >100mmHg – **no max dose**
PAEDIATRIC DOSAGE – S2 / S3	
NOT APPROVED	

ADULT DOSAGE – P1 / P2	
• Pain syndromes associated with suspected AMI **OR** myocardial ischaemia • Cardiogenic pulmonary oedema	
SUBLING	400mcg Repeated at 5 min intervals whilst symptoms continue and systolic BP >100mmHg – **no max dose**
PAEDIATRIC DOSAGE – P1 / P2	
NOT APPROVED	

ADULT DOSAGE – ACP	
• Pain syndromes associated with suspected AMI **OR** myocardial ischaemia • Cardiogenic pulmonary oedema	
SUBLING	400mcg Repeated at 5 min intervals whilst symptoms continue and systolic BP >100mmHg – **no max dose**
• Autonomic dysreflexia with a systolic BP ≥160 mmHg • Irukandji envenomation syndrome with a systolic BP ≥160 mmHg	
SUBLING	400mcg May be repeated at 5 min intervals – **no max dose**
PAEDIATRIC DOSAGE – ACP	
NOT APPROVED	

ADULT DOSAGE – ICP	
• Pain syndromes associated with suspected AMI **OR** myocardial ischaemia • Cardiogenic pulmonary oedema	
SUBLING	400mcg Repeated at 5 min intervals whilst symptoms continue and systolic BP >100mmHg – **no max dose**
• Autonomic dysreflexia with a systolic BP ≥160 mmHg • Irukandji envenomation syndrome with a systolic BP ≥160 mmHg	
SUBLING	400mcg Repeated at 5 min intervals – **no max dose**
PAEDIATRIC DOSAGE – ICP	
• Pain syndromes associated with suspected AMI **OR** myocardial ischaemia • Cardiogenic pulmonary oedema	
NOT APPROVED	
• Autonomic dysreflexia with a systolic BP ≥160 mmHg • Irukandji envenomation syndrome with a systolic BP ≥160 mmHg	
SUBLING	***Appropriate Medical Officer consultation and approval required in all situations***

ADULT DOSAGE – ICP ESoR Aeromedical	
• Cardiac chest pain unresponsive to sublingual nitrates, narcotics **AND**/**OR** ßeta blockers (ESoR – Aeromedical only)	
IV inf	Mix 30mg (6mL) of GTN with 44mL of Glucose 5% in a 50mL syringe to achieve a final concentration of 600 mcg/mL. Ensure all syringes are appropriately labelled.[4] Commence infusion at 1 mL/hr (10 mcg/min) and increase by 1 to 2 mL/hr (10 to 20 mcg/min) every 3-5 minutes if systolic BP >100 and the patient has ongoing chest pain. If at anytime the patient becomes unresponsive or hypotensive, cease infusion immediately. Infusion may be recommenced at 50% the preceding dose when patient's GCS 15 and has a systolic BP ≥100mmHg.
PAEDIATRIC DOSAGE – ICP ESoR Aeromedical	
NOT APPROVED	

QAS Drug Class • Antipsychotic	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 5mg/1mL *Haloperidol* (Serenace)	**QAS Authorised Routes of Administration** • ICP – IM

Phyarmacology
Haloperidol possesses a strong activity against delusions and hallucinations, most likely due to an effective dopaminergic receptor blockage in the mesocortex and the limbic system of the brain.

Metabolism
By the liver with excretion by the urine, bile and faeces.

Onset (IM)	Duration (IM)	Half Life (elimination)
5 min (peak 20 min)	2 to 3 hrs	20 hrs

Indications
- Acute psychosis

Contraindications
- KSAR
- Parkinson's disease

Precautions
- Patients who have taken alcohol or other drugs may develop severe hypotension
- ALOC
- Elderly debilitated patients
- History of dystonic reactions
- Neuroleptic Malignant Syndrome (NMS)
- Tardive Dyskinesia

Side Effects
- Anxiety & euphoria
- Extrapyramidal reaction
- Hypotension
- Lethargy & drowsiness
- Respiratory depression

Special notes:

1. Dose administered will depend on patient's age, physical status and severity of symptoms.[10]
2. Appropriate Medical Officer consultation and approval is required when Haloperidol is to be administered following Midazolam (maximum dose) administration when sedating severely agitated patients.
3. Haloperidol is noted for its strong early and late extrapyramidal side effects.[51]
4. Haloperidol in isolation does not usually affect blood pressure, but care should be exercised in patients with cardiovascular disorders, or being treated with antihypertensives, due to the possibility of unexpected hypotension and/or precipitation of angina.[26]

ADULT DOSAGE – ICP

- Acute psychosis

IM	**≥50 yrs**	5mg – **total max dose 5mg**
	<50 yrs	10mg – **total max dose 10mg**

PAEDIATRIC DOSAGE – ICP

NOT APPROVED

HEPARIN

QAS Drug Class • Anticoagulant	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 5000 IU/5mL *Heparin*	**QAS Authorised Routes of Administration** • **ICP** – IV • **ICP ESoR Aeromedical** – IV inf (QCC taskings)

Pharmacology

Heparin is an anticoagulant agent which combines with anti-thrombin III to inhibit Factor X and the conversion of pro-thrombin to thrombin. Heparin (sodium) therefore reduces the propensity for new clot formation and also inhibits other processes in the clotting cascade. Heparin sodium is NOT a thrombolytic agent.

Metabolism

Heparin sodium is metabolised via biotransformation in the liver and reticulo-endothelial system.

Onset (IV)	Duration (IV)	Half Life (elimination)
~30 sec[52]	3 to 6 hrs	1.5 hrs

Indications

- For patients with STEMI (as defined in the QAS Coronary Artery Reperfusion Check List and LWI) **AND** who have been accepted for urgent PCI
- Critical care patients requiring anticoagulation during interfacility transport (ESoR – Aeromedical only)

Contraindications

- KSAR
- Identical to contraindication list for prehospital fibrinolysis, unless specifically authorised under the relevant LWI (see Tenecteplase DTP and QAS Coronary Artery Reperfusion Check List)

Precautions

- Renal impairment

Side Effects

- Thrombocytopenia
- Bleeding

Special notes:

1. Heparin is incompatible with the following QAS authorised IV medications – Amiodarone, Hydrocortisone, Phenytoin & Promethazine.[8]
2. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP

- For patients with STEMI (as defined in the QAS Coronary Artery Reperfusion Check List) **AND** who have been accepted for urgent PCI

IV	5000 units – **single dose only**

PAEDIATRIC DOSAGE – ICP

NOT APPROVED

ADULT DOSAGE – ICP ESoR Aeromedical

- Critical care patients requiring anticoagulation during interfacility transport (ESoR – Aeromedical only)

IV	***QCC consultation and approval required in all situations*** 5000 units – **single dose only** (followed by maintenance infusion)
IV inf	***QCC consultation and approval required in all situations*** **Maintenance infusion** - Mix 25,000 units (25mL) of Heparin with 25mL of Sodium Chloride 0.9% in a 50mL syringe to achieve a final concentration of 500 units/mL. Ensure all syringes are appropriately labelled.[4] Heparin infusions are to be administered via a syringe driver at the following doses. **Patient Weight (kg)** / **Maintenance Infusion Dose (25,000 units in 50 mL)** <70 kg: 800 units per hour (1.6 mL/hr) ≥70 kg: 1000 units per hour (2.0 mL/hr) If the patient has an existing Heparin infusion, ICP ESoR – Aeromedical officers are to use the administration rate (units per hour) already preset.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

QAS Drug Class	**Schedule**
• Corticosteroid	• S4 (Restricted drugs)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Vial, 100mg *Hydrocortisone* (Solu-Cortef)	• **ECP** / **ICP** – IM & IV

Pharmacology
Hydrocortisone Sodium Succinate is an adrenocortical steroid that produces an anti-inflammatory process. This inhibits the accumulation of inflammatory cells at inflammation sites, phagocytosis, lysosomal enzyme release and synthesis and/or release of mediators of inflammation. Additionally, it prevents and suppresses cell mediated immune reactions.

Metabolism
Hepatic.

Onset (IV)	**Duration (IV)**	**Half Life (elimination)**
1 to 2 hrs	6 to 12 hrs	6 to 8 hrs

Indications
- Moderate **OR** severe asthma
- Severe allergic reaction **OR** anaphylaxis (requiring Adrenaline administration)
- Symptomatic adrenal insufficiency[53] (with a known history of Addison's disease, Congenital Adrenal Hyperplasia, Pan-hypopituitarism or long term steroid administration)

Contraindications
- KSAR

Precautions
- Hypertension

Side Effects
- Nil

Special notes:

1. Each 100mg Hydrocortisone vial is to be reconstituted with 2mL of Water for Injection.[5]
2. A calculated IM volume of >2mL is required to be administered at different IM sites using separate syringes.
3. Hydrocortisone is incompatible with the following QAS authorised IV medications – Midazolam, Phenytoin & Promthazine.[8]
4. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ECP

- Moderate **OR** severe asthma
- Severe allergic reaction **OR** anaphylaxis (requiring Adrenaline administration)

IM	***Appropriate Medical Officer consultation and approval required in all situations*** 200 mg **– single dose only**
IV	***Appropriate Medical Officer consultation and approval required in all situations*** 200mg **– single dose only** – slow IV push over 1 min[5]

- Symptomatic adrenal insufficiency (with a known history of Addison's disease, Congenital Adrenal Hyperplasia, Pan-hypopituitarism or long term steroid administration)

IM	***Appropriate Medical Officer consultation and approval required in all situations*** 100 mg **– single dose only**
IV	***Appropriate Medical Officer consultation and approval required in all situations*** 100mg **– single dose only** – slow IV push over 1 min[5]

PAEDIATRIC DOSAGE – ECP

- Moderate **OR** severe asthma
- Severe allergic reaction **OR** anaphylaxis (requiring Adrenaline administration)
- Symptomatic adrenal insufficiency (with a known history of Addison's disease, Congenital Adrenal Hyperplasia, Pan-hypopituitarism or long term steroid administration)

IM	***Appropriate Medical Officer consultation and approval required in all situations*** 5 mg/kg – single dose not to exceed 100mg
IV	***Appropriate Medical Officer consultation and approval required in all situations*** 5 mg/kg – single dose not to exceed 100mg – slow IV push over 1 min

ADULT DOSAGE – ICP

- Moderate **OR** severe asthma
- Severe allergic reaction **OR** anaphylaxis (requiring Adrenaline administration)

IM	200mg **– single dose only**
IV	200mg **– single dose only** – slow IV push over 1 min

- Symptomatic adrenal insufficiency (with a known history of Addison's disease, Congenital Adrenal Hyperplasia, Pan-hypopituitarism or long term steroid administration)

IM	100mg **– single dose only**
IV	100mg **– single dose only** – slow IV push over 1 min

PAEDIATRIC DOSAGE – ICP

- Moderate **OR** severe asthma
- Severe allergic reaction **OR** anaphylaxis (requiring Adrenaline administration)
- Symptomatic adrenal insufficiency (with a known history of Addison's disease, Congenital Adrenal Hyperplasia, Pan-hypopituitarism or long term steroid administration)

IM	5 mg/kg – single dose not to exceed 100mg
IV	5 mg/kg – single dose not to exceed 100mg – slow IV push over 1 min

QAS Drug Class • Hypertonic crystalloid solution	**Schedule** • Unscheduled[1]
QAS Presentation • Viaflex plastic container, 250mL *Hypertonic Saline (HTS) 7.5%*	**QAS Authorised Routes of Administration** **ICP ESoR – Aeromedical** – IV inf (QCC/road tasks)

Pharmacology
HTS 7.5% exerts an osmotic effect on swollen cerebral tissue and the extracellular space to control intracranial pressure in an attempt to diminish the effects of secondary brain injury. Animal and human studies additionally suggest beneficial vasoregulatory, haemodynamic, neurochemical and immunological properties.

Metabolism
Excreted by the kidneys.

Onset (Iv inf)	**Duration (iV inf)**	**Half Life (elimination)**
Immediate	Hrs	Not applicable

Indications
- Traumatic head injury with GCS ≤8 **AND** 1 or more of the following criteria:
  a. Fixed dilated pupil/s; **AND/OR**
  b. Unilateral neurological signs; **AND/OR**
  c. GCS deterioration of a further 2 points (≤6) whilst in QAS care.

Contraindications
- IO administration[54]

Precautions
- Nil in the setting of acute neurotrauma which satisfies the QAS indication listed above

Side Effects
- Phlebitis
- Volume overload
- Renal failure
- Osmotic demyelination syndrome
- Hypertonic Saline induced hypernatraemia
- Electrolyte abnormalities

Special notes:
1. Suitably qualified officers should where possible administer HTS 7.5% through an appropriately placed CVL.
2. Transfusion of blood or blood products must be independent of a HTS 7.5% infusion as highly concentrated HTS 7.5% can cause lysis of the red blood cell.[55]
3. HTS 7.5% 250mL viaflex plastic containers are not available via DCS stores. ESoR – Aeromedical stations are to procure all supplies from the QAS Medical Directors Office.

ADULT DOSAGE – ICP ESoR Aeromedical

- Traumatic head injury with GCS ≤8 **AND** 1 or more of the following criteria:
  a. Fixed dilated pupil/s; **AND/OR**
  b. Unilateral neurological signs; **AND/OR**
  c. GCS deterioration of a further 2 points (≤6) whilst in QAS care.

IV inf	5 ml/kg – dose not to exceed 250mL

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

- Traumatic head injury with GCS ≤8 **AND** 1 or more of the following criteria:
  a. Fixed dilated pupil/s; **AND/OR**
  b. Unilateral neurological signs; **AND/OR**
  c. GCS deterioration of a further 2 points (≤6) whilst in QAS care.

IV inf	***QCC OR appropriate medical officer consultation and approval required in all situations*** 5 ml/kg – dose not to exceed 250mL

QAS Drug Class • Glucose regulatory hormone	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Vial, 10mL (1000 units) *Actrapid®* [56]	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV inf (QCC taskings only)

Pharmacology
Insulin is a metabolic regulatory anabolic protein hormone that lowers blood glucose levels by binding to insulin receptors to increase glucose uptake, inhibit hepatic glucose output and promote glycogen production.

Metabolism
The majority of circulating Insulin is metabolised by the kidneys.

Onset (IV)	Duration (IV)	Half Life (elimination)
~30 mins	Hrs	5 to 7 mins

Indications
- Diabetic ketoacidosis (DKA)
- Hyperosmolar Hyperglycaemic Nonketotic Syndrome (HHNS)
- Critical care patients during interfacility transport

Contraindications
- Hypoglycaemia

Precautions
- Rapid correction of hyperglycaemia may contribute to cerebral oedema and electrolyte imbalances
- Hypoglycaemia may occur if the insulin dose is too high in relation to the insulin requirement

Side Effects
- Irritation and redness at IV cannulation site

Special notes:
1. All insulin infusions are to be initiated using hospital supplies, insulin will not be carried by QAS.[4]
2. Actrapid® should only be used if the solution is ~~water~~ clear and colourless.[56]
3. After opening, Actrapid® vials may be kept at room temperature (below 25°C) for a maximum of 4 weeks.[56]
4. Minimum hourly BGL monitoring is required for all patients on Actrapid® infusions.
5. Actrapid® is incompatible with the following QAS authorised IV medication – Phenytoin.[8] All cannulas and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP ESoR Aeromedical

- Diabetic ketoacidosis (DKA)
- Hyperosmolar Hyperglycaemic Nonketotic Syndrome (HHNS)
- Critical care patients during interfacility transport

IV inf

QCC consultation and approval required in all situations

Mix 50 units (0.5mL) of Actrapid® with 49.5mL of Sodium Chloride 0.9% in a 50mL syringe to achieve a final concentration of 1 unit/mL. Ensure all syringes are appropriately labelled.[4] Actrapid® infusions are to be administered via a syringe driver using the following sliding scale.

Blood Glucose Level (mmol/L)	Infusion Dose (50 units in 50mL)
≤5	0 units/hr (mL/hr)
5.1 to ≤10	1 units/hr (mL/hr)
10.1 to ≤15	2 units/hr (mL/hr)
15.1 to ≤20	3 units/hr (mL/hr)
20.1 to ≤25	4 units/hr (mL/hr)
> 25	5 units/hr (mL/hr)

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

QAS Drug Class • Sympathomimetic agent • Inotrope	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 1mg/5mL *Isoprenaline*	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV inf (QCC tasks only)

Pharmacology
Synthetic sympathomimetic amine that is structurally related to adrenaline but acts almost exclusively on ßeta$_1$ adrenergic receptors with a prominent chronotropic, inotropic and dromotropic effect.

Metabolism
Isoprenaline is metabolised via biotransformation in the liver and reticulo-endothelial system with metabolites excreted by the kidneys.

Onset (IV inf)	Duration (IV inf)	Half Life (elimination)
Immediate	Not applicable	<2 hrs

Indications
- Bradycardia with poor perfusion unresponsive to TCP
- Critical care patients during interfacility transport

Contraindications
- KSAR
- Heart rate >120 beats per minute
- Tachycardia or AV Block caused by cardiac glycoside (Digoxin) toxicity
- Active cardiogenic chest pain

Precautions
- Acute or recent myocardial infarction
- Ischaemic heart disease
- Hypotension in the intravascular depleted patient
- Hypertension

Side Effects
- Palpitations
- Cardiogenic chest pain
- Arrhythmias
- Headache

Special notes:

1. All Isoprenaline infusions are to be initiated using hospital supplies, Isoprenaline will not be carried by the QAS flight team.[4] Hospital presentations may vary – final concentration must be 3mg/50mL.
2. Cardiac monitoring is required for all patients on Isoprenaline infusions.
3. Careful dose adjustment is required in the case of coronary insufficiency, diabetes or hyperthyroidism.
4. Isoprenaline is incompatible with the following QAS authorised IV medications – Frusemide & Sodium Bicarbonate 8.4%.[8]
5. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP ESoR Aeromedical

- Bradycardia with poor perfusion unresponsive to TCP
- Critical care patients during interfacility transport

IV inf	***QCC consultation and approval required in all situations*** Mix 3mg (15mL) of Isoprenaline with 35mL of Glucose 5% in a 50mL syringe to achieve a final concentration of 60 mcg/mL. Ensure all syringes are appropriately labelled. Commence infusion at 2 mcg/min (2 mL/hr) and increase by 1 to 2 mcg/min (1 to 2 mL/hr) every 3 to 5 min as determined by ventricular response and MAP.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

KETAMINE

QAS Drug Class	**Schedule**
• Anaesthetic agent • Analgesic	• S8 (Controlled drugs)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Vial, 200mg/2mL *Ketamine* (Ketalar)	• ICP – IV

Pharmacology

Ketamine is an anaesthetic agent that acts as a NMDA receptor antagonist. At lower doses this drug produces significant analgesia whilst the airway reflexes and respiratory drive are preserved. Unlike other general anaesthetics, there is minimal haemodynamic compromise as Ketamine acts as a sympathomimetic agent. Transient tachycardia and hypertension may result. Ketamine produces a dissociative state and this will cause the patient to potentially have significant issues with perception. This results in disinhibition or emergence phenomena in a small number of patients.

Metabolism

Ketamine undergoes extensive hepatic metabolism, approx 90% of the drug is excreted in the urine as metabolites.

Onset (IV)	**Duration (IV)**	**Half Life (elimination)**
30 secs	5 to 20 mins (QAS doses)	10 to 15 mins (dose variable)

Indications

- Adjunct to Morphine (0.1 to 0.2 mg/kg) in patients with severe traumatic pain associated with:
  a. Fracture reduction and splinting; **OR**
  b. Multiple or significant fractures requiring facilitated extrication

Contraindications

- KSAR
- Age <1 yrs
- GCS ≤12 yrs
- Uncontrolled hypertension defined as SBP >180 mmHg and DBP >100 mmHg
- Suspected acute coronary syndrome or acute heart failure
- Known hydrocephalus or raised intra-ocular pressure

Precautions

- Age >65 yrs
- Patients who have been administered Midazolam or other CNS depressant medication
- Patients with significant hypovolaemia – exaggerated effects and delayed onset of action
- Globe injuries
- Complex facial injuries and fractures
- Patients who have impaired respiratory function
- Patients exhibiting psychotic symptoms

Side Effects

- Dissociation and trance-like state – "Ketamine stare"
- A number of patients will display transient hypertonicity and nystagmus. This does not require intervention or treatment. This transient reaction should not be confused with significant disinhibition.
- Disinhibition – disturbed perception during initial administration which may require a small dose of Midazolam to treat the patient if this does not settle with attempts to calm the patient. (Refer Sedation CPP)
- Emergence – issues with distorted perception as the drug effects wear off. Generally these will settle with removal of significant stimulation but small dose of midazolam may be required if this fails. (Refer Sedation CPP)
- Hypertension, tachycardia
- Depression of consciousness and rarely respiratory depression
- Hypersalivation (uncommon but may require administration of Atropine – refer Sedation CPP)
- Vomiting
- Laryngospasm

Special notes:

1. Ketamine must only be administered after 0.1 to 0.2 mg/kg of Morphine has been administered.
2. Paramedics are to adhere to all the requirements of the Procedural Sedation CPP, including the application of nasal $EtCO_2$ measurement where practical.
3. Midazolam is not to be administered unless the patient displays significant signs of emergence that are not attenuated with reassurance.
4. Once a maximum dose of 1 mg/kg is administered the QAS Medical Director must be called in the first instance before any further Ketamine is administered. If the Medical Director is not available, medical consultation with a senior emergency medicine physician (urban areas) or the QCC Medical Coordinator (rural areas) should be the alternative.
5. Elevation of BP is seen within minutes of commencement and usually returns to usual values within 15 min after injection.[26]
6. All cases where Ketamine has been administered are to be reported to the Medical Director (24/7) – cases after 12 midnight can be telephoned through the next morning if there were no complications. Additionally, the 'Ketamine Capture Form' should be completed and is to be forwarded with a LIFEPAK®12 code summary to the Office of the QAS Medical Director – Block A Level 3, Department of Community Safety, Kedron Park.

ADULT DOSAGE – ICP

- Adjunct to Morphine (0.1 to 0.2 mg/kg) in patients with severe traumatic pain associated with:
  a. **Fracture reduction** and splinting; **OR**
  b. **Multiple or significant fractures** requiring facilitated extrication

IV	10 to 20mg Repeated every 2 to 3 min – **total max dose 1 mg/kg** * Mix 200mg (2mL) of Ketamine with 18mL Sodium Chloride 0.9%[10] **OR** Water for Injection[10] in a 20mL syringe to achieve a final concentration of 10 mg/mL

PAEDIATRIC DOSAGE – ICP

- Adjunct to Morphine (0.1 to 0.2 mg/kg) in patients with severe traumatic pain associated with:
  a. **Fracture reduction** and splinting; **OR**
  b. **Multiple or significant fractures** requiring facilitated extrication

IV	**≥1 yr**	100 mcg/kg (0.1mg/kg) Repeated every 2 to 3 min – **total max dose 1 mg/kg** * Mix 200mg (2mL) of Ketamine with 18mL Sodium Chloride 0.9%[10] **OR** Water for Injection in a 20mL syringe to achieve a concentration of 10 mg/mL. Discard 18mL of the prepared solution and dilute with a further 18mL of diluent in a 20mL syringe to achieve a final concentration of 1 mg/ml.
	<1 yr	**NOT APPROVED**

LIGNOCAINE 2%

QAS Drug Class • Antiarrhythmic (Vaughan-William class Ib) • Local anaesthetic	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 100mg/5mL *Lignocaine 2%*[57]	**QAS Authorised Routes of Administration** • **ICP** – IV & IO • **ICP ESoR Aeromedical** - Subcut

Pharmacology
Lignocaine stabilises all potentially excitable membranes and prevents the initiation and transmission of nerve impulses. It is for this reason that it is successful in decreasing excitability of the cardiac muscle and conduction velocity through the AV node. Furthermore, it is also used as a local anaesthetic.

Metabolism
80% metabolised by the liver and remainder excreted by the kidneys.

Onset (IV)	Duration (IV)	Half Life (elimination)
1 to 3 mins	20 to 30 mins	1 to 2 hrs

Indications
- Conscious VT without haemodynamic compromise
- To reduce the pain associated with IO drug and fluid administration for patients in which an EZ-IO® needle has been inserted (when the patient is not in cardiac arrest)
- Local anaesthesia for the purpose of radial artery line (ART) placement (ESoR – Aeromedical only)

Contraindications
- Conscious VT without haemodynamic compromise
  a. KSAR
  b. Bradycardia
  c. Current heart failure
  d. Heart block or conduction defects
  e. Torsades de Pointes
- To reduce the pain associated with IO drug and fluid administration for patients in which an EZ-IO® needle has been inserted (when patient is not in cardiac arrest)
  a. KSAR
- Local anaesthesia for the purpose of radial artery line placement
  a. KSAR

Precautions
- Conscious VT without haemodynamic compromise
  a. Hypotension and poor perfusion
- To reduce the pain associated with IO drug and fluid administration for patients in which an EZ-IO® needle has been inserted (when patient is not in cardiac arrest)
  a. Nil
- Local anaesthesia for the purpose of radial artery line placement
  a. Potential for intravascular injection (*see Special notes #1*)

Side effects
- Convulsions
- Hypotension
- Nausea
- Tinnitus

Special notes:
1. Local anaesthesia injections should always be made slowly with frequent aspirations to avoid inadvertent intravascular injection which can produce cerebral symptoms even at low doses.[10]
2. IV Lignocaine 2% is incompatible with the following QAS authorised IV medications – Phenytoin & Sodium Bicarbonate 8.4%.[8]
3. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP	
• Conscious VT without haemodynamic compromise	
IV	1 to 1.5 mg/kg - slow IV push over 2 to 3 mins (not to exceed 25 to 50mg/min)[57] Repeated once at half the initial dose at 10 min - **total max dose 300mg**
• To reduce the pain associated with IO drug and fluid administration for patients in which an EZ-IO® needle has been inserted (when the patient is not in cardiac arrest)	
IO	60mg **(40mg Lignocaine 2% followed by a rapid Sodium Chloride 0.9% 10mL flush, followed by an additional 20mg Lignocaine 2%)[58] - total max dose 60mg**
PAEDIATRIC DOSAGE – ICP	
• Conscious VT without haemodynamic compromise	
NOT APPROVED	
• To reduce the pain associated with IO drug and fluid administration for patients in which an EZ-IO® needle has been inserted (when the patient is not in cardiac arrest)	
IO	Up to 20 mg – **single dose only** - **max dose 1 mg/kg**

ADULT DOSAGE – ICP ESoR Aeromedical	
• Local anaesthetic for the purpose of radial artery (ART) line placement (ESoR – Aeromedical only)	
Subcut	≤10mg (0.5mL)
PAEDIATRIC DOSAGE – ICP ESoR Aeromedical	
NOT APPROVED	

MAGNESIUM SULPHATE

QAS Drug Class • Electrolyte	**Schedule** • Unscheduled[1]	
QAS Presentation • Amp, 10 mmol (2.47g)/5mL, *Magnesium Sulphate*	**QAS Authorised Routes of Administration** • **ACP** – IV & IV inf **(on successful completion of QAS training)** • **ICP** – IV, IV inf & IO	
Pharmacology Magnesium plays a vital role in neurochemical transmission and is essential for neurochemical functioning.		
Metabolism Filtered in the kidneys and excreted in urine.		
Onset (IV inf) Immediate	**Duration (IV inf)** 30 mins	**Half Life (elimination)** Variable
Indications • Box Jellyfish envenomation unresponsive to antivenom therapy • Eclampsia • Irukandji envenomation syndrome • Torsades de Pointes • Severe life threatening asthma (only in patients who have required IV Salbutamol **OR** IM/IV Adrenaline)		
Contraindications • KSAR • Heart block • Renal failure		
Precautions • Renal impairment		
Side Effects • Pain at the cannulation site • Hyper-magnesaemia a. CNS depression b. Hypotension c. Muscle weakness and/or paralysis d. Nausea and vomiting e. Respiratory depression and/or paralysis		

Special notes:

1. Excess Magnesium Sulphate results in Magnesium Sulphate toxicity which may cause hypotension, respiratory depression and loss of deep tendon reflexes (hyporeflexia).
2. Administration of 2 g of IV Magnesium Sulphate improves pulmonary function when used as an adjunct to standard therapy in adult patients with very severe, acute asthma.[59]
3. Children treated with intravenous Magnesium Sulphate infusions for moderate to severe asthma had significantly greater improvement in short term pulmonary function without any significant alteration in blood pressure, suggesting a role for this agent as an adjunct in the treatment of such patients.[60]
4. Magnesium Sulphate is incompatible with the following QAS authorised IV medication – Sodium Bicarbonate 8.4%.[8]
5. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP (TRIAL - on successful completion of QAS training)	
• Irukandji envenomation syndrome • Box Jellyfish envenomation unresponsive to antivenom therapy	
IV	**Loading dose** - 20 mmol - slow IV push over 10 minutes (SPRINGINFUSOR® use is highly recommended) - followed by maintenance infusion listed below
IV inf	**Maintenance infusion** (immediately following loading dose) – Inject 20 mmol of Magnesium Sulphate in a 1000mL bag of Sodium Chloride 0.9%. Ensure bag Is appropriately labelled.[4] Administer infusion over 60 mins – **total max dose 40mmol (loading dose and maintenance Infusion dose)**

PAEDIATRIC DOSAGE – ACP (TRIAL - on successful completion of QAS training)	
• Irukandji envenomation syndrome • Box Jellyfish envenomation unresponsive to antivenom therapy	
IV	0.1 mmol/kg (rounded up to the nearest 0.5 mmol) – slow IV push over 10 mins (SPRINGINFUSOR® use is highly recommended) – single dose not to exceed 5 mmol - Repeated once at 10 mins (only if indicated for ongoing treatment) – **total max dose 10 mmol**

ADULT DOSAGE – ICP	
• Eclampsia • Irukandji envenomation syndrome • Box Jellyfish envenomation unresponsive to antivenom therapy	
IV	**Loading dose** - 20 mmol - slow IV push over 10 minutes (SPRINGINFUSOR® use is highly recommended) - followed by maintenance infusion listed below
IV inf	**Maintenance infusion** (immediately following loading dose) – Inject 20 mmol of Magnesium Sulphate in a 1000mL bag of Sodium Chloride 0.9%. Ensure bag Is appropriately labelled.[4] Administer infusion over 60 mins – **total max dose 40mmol (loading dose and maintenance Infusion dose)**
• Torsades de Pointes	
IV / IO	10 mmol - slow IV push over 10 minutes (SPRINGINFUSOR® use is highly recommended) – Repeated once at 10 mins (only if indicated for ongoing treatment) – **total max dose 20 mmol**
• Severe life threatening asthma (only in patients who have required IV Salbutamol **OR** IM/IV Adrenaline)	
IV / IO	10 mmol - slow IV push over 10 minutes (SPRINGINFUSOR® use is highly recommended) – **single dose only**

PAEDIATRIC DOSAGE – ICP	
• Irukandji envenomation syndrome • Box Jellyfish envenomation unresponsive to antivenom therapy	
IV	0.1 mmol/kg (rounded up to the nearest 0.5 mmol) – slow IV push over 10 mins (SPRINGINFUSOR® use is highly recommended) – single dose not to exceed 5 mmol - Repeated once at 10 mins (only if indicated for ongoing treatment) – **total max dose 10 mmol**
• Torsades de Pointes	
IV / IO	0.1 mmol/kg (rounded up to the nearest 0.5 mmol) – slow IV push over 10 mins (SPRINGINFUSOR® use is highly recommended) – single dose not to exceed 5 mmol - Repeated once at 10 mins (only if indicated for ongoing treatment) – **total max dose 10 mmol**
• Severe life threatening asthma (only in patients who have required IV Salbutamol **OR** IM/IV Adrenaline)	
IV / IO	0.1 mmol/kg (rounded up to the nearest 0.5 mmol) – slow IV push over 10 mins (SPRINGINFUSOR® use is highly recommended) – single dose is not to exceed 5 mmol – **single dose only**
• Eclampsia	
NOT APPROVED	

QAS Drug Class • Inhaled analgesic (when inhaled at low doses)	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Bottle, 3mL *Methoxyflurane*[61]	**QAS Authorised Routes of Administration** • **FR** / **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** - INH

Pharmacology
Methoxyflurane is an inhalation agent providing analgesia at low concentrations. Methoxyflurane is more susceptible to metabolism than other halogenated ethers and has a greater propensity to diffuse into fatty tissue.

Metabolism
By the liver and excreted mainly by the lungs.

Onset (INH)	Duration (INH)	Half Life (elimination)
1 to 3 mins	5 to 10 mins	Not available

Indications
- Pain relief

Contraindications
- KSAR
- Children <1 yrs
- History of significant liver or renal disease
- Malignant Hyperthermia

Precautions
- ALOC
- Intoxicated patients or drug affected patients

Side effects
- ALOC
- Cough
- Renal/hepatic failure following repeated high dose exposure to Methoxyflurane

Special notes:
1. The manufacturer recommends use only by children who can self monitor pain and self administer Methoxyflurane with the inhaler, poor administration will lead to ineffective analgesia.
2. Deep sedation has been identified with Methoxyflurane administration in patients <5 yrs.[62]
3. At no time should unconsciousness be deliberately induced using Methoxyflurane.
4. At no time should a patient self administering Methoxyflurane be left unattended.
5. The lowest dose of Methoxyflurane to provide analgesia should be used.
6. If the patient prefers simultaneous inhalation through both nose and mouth, fit the inhaler shoulder adjacent to the mouthpiece into a standard anaesthetic face mask.[10]
7. The total weekly dose should not exceed 15mL with administration of consecutive days not recommended.[10]
8. To reduce the risk of occupational exposure to Methoxyflurane Officers are to ensure the following:
   a. Only 1 dose of 3mL should be administered per patient whilst in the ambulance vehicle
   b. That no single officer should administer more than 2 doses of Methoxyflurane in the ambulance per shift
   c. Where possible, ambulance vehicles are to adequately ventilated
   d. Oxygen administration via the "Penthrox™" inhaler should not be initiated in a confined area.[63]

ADULT DOSAGE – FR / S2 / S3 / P1 / P2 / ACP / ICP

- Pain relief

INH	3mL Repeated once after 20 mins – **total max dose 6mL**

PAEDIATRIC DOSAGE – FR / S2 / S3 / P1 / P2 / ACP / ICP

- Pain relief

INH	**≥1 yr**	3mL – **single dose only**
	<1 yr	**NOT APPROVED**

METOCLOPRAMIDE

QAS Drug Class • Antiemetic	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 10mg/2mL *Metoclopramide* (Maxalon)	**QAS Authorised Routes of Administration** • **ACP** / **ICP** – IM & IV

Pharmacology
Metoclopramide hydrochloride is used in this setting as an anti-emetic. It works by inhibiting gastric smooth muscle relaxation, accelerating intestinal transit and gastric emptying. Further, it raises the threshold of the chemoreceptor trigger zone in the floor of the fourth ventricle.

Metabolism
By the liver and excreted by the kidneys.

Onset	Duration (IM / IV)	Half Life (elimination)
1 to 3 mins (IV) / 10 to 15 min (IM)	1 to 2 hrs	2.5 to 5 hrs

Indications
- Significant nausea **AND/OR** vomiting
- Use with Morphine if the patient has previously experienced nausea **AND/OR** vomiting with narcotics

Contraindications
- KSAR
- Children <16 yrs
- History of dystonic reactions
- Not to be given within 6 hrs of a phenothiazine administration (eg. Stemetil® (Prochlorperazine) / Promethazine)

Precautions
- GI haemorrhage
- Patients with bowel obstruction or perforation

Side Effects
- Drowsiness, lethargy, dry mouth
- Oculogyric crisis
- Dystonic reaction (1%)[10]

Special notes:
1. A transient intense feeling of anxiety and restlessness followed by drowsiness may occur with rapid IV injection.[26]
2. The routine administration of Metoclopramide with Morphine for patients with musculoskeletal trauma is not indicated.[64]
3. Metoclopramide is incompatible with the following QAS authorised IV medications – Calcium Gluconate 10%, Frusemide & Sodium Bicarbonate 8.4%.[8]
4. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP / ICP

- Significant nausea **AND/OR** vomiting
- Use with Morphine if the patient has previously experienced nausea **AND/OR** vomiting with narcotics

IM	**≥16 yrs**	10 to 20mg
	<16 yrs	**NOT APPROVED**
IV	**≥16 yrs**	10 to 20mg slow push over 1 to 2 min
	<16 yrs	**NOT APPROVED**

PAEDIATRIC DOSAGE – ACP / ICP

NOT APPROVED

METOPROLOL

QAS Drug Class • ßeta adrenoceptor blocker (ßeta$_1$ selective)	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 5mg/5mL *Metoprolol* (Betaloc)[65]	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV (QCC tasks only)

Pharmacology
Metoprolol is a selective ßeta$_1$ receptor blocker used in the treatment of cardiovascular disease. Metoprolol blocks the action of the sympathetic nervous system thereby reducing heart rate, the force of myocardial contraction and thereby reducing blood pressure and myocardial oxygen demand.

Metabolism
By the liver and excreted by the kidneys (within 72hrs).

Onset (IV)	Duration (IV)	Half Life (elimination)
1 to 2 mins	5 to 8 hrs	3 to 7 hrs

Indications
- Cardiac chest pain unresponsive to nitrates and narcotic analgesia
- Rate control in the setting of ACS

Contraindications
- KSAR
- Acute heart failure
- Heart rate <60 beats
- Systolic BP <90 mmHg
- Second or third degree AV block
- Concomitant antiarrhythmic medication
- Bronchospasm or allergic disorders which may suggest a predisposition to bronchospasm

Precautions
- History of heart failure
- First degree AV block
- Diabetes Mellitus (patient receiving Insulin or oral hypoglycaemics)

Side Effects
- Hypotension
- Bradycardia
- Palpitations
- Dizziness
- Headache

Special notes:
1. Cardiac monitoring is required for all patients that have been administered Metoprolol.
2. Metoprolol 5mg/5mL ampoules are not available via DCS stores. ESoR – Aeromedical stations are to procure all supplies from the QAS Medical Director's Office.

ADULT DOSAGE – ICP ESoR Aeromedical

- Cardiac chest pain unresponsive to nitrates and narcotic analgesia
- Rate control in the setting of ACS

IV	***QCC consultation and approval required in all situations*** 1 to 2 mg Repeated every 5 mins – **total max dose 10mg**

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

MIDAZOLAM

QAS Drug Class • Benzodiazepine (short acting)	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 5mg/1mL *Midazolam*	**QAS Authorised Routes of Administration** • **ACP** - IM • **ICP** – IM, IV & IO

Pharmacology
Midazolam hydrochloride is a short acting central nervous system depressant that induces amnesia, anaesthesia, hypnosis and sedation. It achieves this by enhancing the action of inhibitory neurotransmitter gamma-amino butyric acid (GABA). Depressant effects occur at all levels of the CNS.

Metabolism
By the liver and excreted by the kidneys.

Onset	Duration	Half Life (elimination)
5 to 15 min (IM) / 1 to 3 mins (IV)	Variable	2.5 hrs

Indications
- Seizures/convulsions
- Sedation for:
  a. Maintenance of established ETT
  b. Severely agitated patients
  c. Agitated head injuries to facilitate assessment and treatment
  d. Patients with trauma requiring fracture reduction, splinting, extrication, or if distressed and agitated by pain despite 0.1 to 0.2 mg/kg Morphine
  e. Patients with burns distressed and agitated by pain despite 0.2 to 0.3 mg/kg Morphine
  f. Procedures
  g. Ketamine disinhibition or emergence

Contraindications
- KSAR to benzodiazepines

Precautions
- Reduced dosages may be required in elderly patients, patients with chronic renal failure, congestive cardiac failure or shock
- Can cause severe respiratory depression in patients with COAD
- Myasthenia gravis
- Multiple sclerosis

Side Effects
- Hypotension
- Respiratory depression particularly when associated with alcohol or narcotics

Special notes:
1. Status epilepticus is present if the patient suffers a seizure >5 mins in duration or if the patient has a seizure and does not recover to GCS 15 before another seizure occurs.
2. Focal seizure activity in a patient who is unconscious or has altered level of consciousness (GCS ≤12) should be treated as a generalized seizure.
3. If a patient has received Midazolam or Diazepam prior to arrival of paramedics this is to be taken into account in the total dose administered.
4. Midazolam is incompatible with the following QAS authorised medications – Frusemide, Hydrocortisone & Sodium Bicarbonate 8.4%.[8]
5. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP		
• Seizures/convulsions		
IM	**≥50 yrs**	2.5mg Repeated at 10 min intervals until seizure is managed – **no max dose**
	<50 yrs	5.0mg Repeated at 10 min intervals until seizure is managed – **no max dose**

PAEDIATRIC DOSAGE – ACP	
• Seizures/convulsions	
IM	200 mcg/kg – single dose not to exceed 5 mg Repeated at half the initial dose (max 2.5mg) at 10 min intervals until seizure is managed – **no max dose**

ADULT DOSAGE – ICP		
• Seizures/convulsions		
IM	**≥50 yrs**	2.5mg Repeated at 10 min intervals until seizure is managed – **no max dose**
IV / IO	**≥50 yrs**	Up to 2.5mg Repeated at 5 min intervals until seizure is managed – **no max dose**
IM	**<50 yrs**	5mg Repeated at 10 min intervals until seizure is managed – **no max dose**
IV / IO	**<50 yrs**	Up to 2.5mg Repeated at 5 min intervals until seizure is managed – **no max dose**
• Sedation to maintain ETT		
IV / IO	2.5mg Repeated with 2.5mg Morphine IV PRN – **no max dose**	
• Sedation for severely agitated patients		
IM	**≥50 yrs**	1 to 5mg Repeated at 1 to 5mg increments every 10 min to achieve moderate sedation (only if IV access not achievable) – **total max dose 15mg**
IV	**≥50 yrs**	1 to 5mg Repeated at 1 to 5mg increments every 5 min to achieve moderate sedation – **total max dose 25mg**
IM	**<50 yrs**	5mg Repeated at 5 to10 mg increments every 10 min to achieve moderate sedation (only if IV access not achievable) – **total max dose 25mg**
IV	**<50 yrs**	2.5 to 5mg Repeated at 2.5 to 5mg increments every 5 min to achieve moderate sedation – **total max dose 25mg**
• Sedation for agitated head injuries to facilitate assessment and treatment		
IM	**NOT AUTHORISED**	
IV	1 to 2.5mg Repeated at 1 to 2mg increments every 5 min until patient is cooperative or allows administration of oxygen and maintenance of spinal immobilisation. Should be avoided in significant hypovolaemia – **no max dose**	
• Sedation for patients with trauma requiring fracture reduction, splinting, extrication, or if distressed and agitated by pain despite 0.1 to 0.2 mg/kg Morphine • Patients with burns distressed and agitated by pain despite 0.2 to 0.3 mg/kg Morphine		
IV	1 to 2mg – **total max dose 2mg**	
• Sedation for procedures		
IV	1 mg Repeated every 2 min until moderate level of sedation achieved – **no max dose**	
• Sedation for patients suffering Ketamine disinhibition or emergence		
IV	1 to 2.5mg Repeated PRN until symptoms settle – **total max dose 5mg**	

PAEDIATRIC DOSAGE – ICP	
• Seizures/convulsions	
IM	200 mcg/kg – single dose not to exceed 5mg Repeated at half the initial dose (max 2.5mg) at 10 min intervals until seizure is managed – **No max dose**
IV / IO	100 mcg/kg (max 2.5mg) Repeated at 5 min intervals until seizure is managed – **no max dose**
• Sedation to maintain ETT	
IV / IO	100 mcg/kg (max 2.5mg) Repeated at 3 to 5 min intervals with 100mcg/kg of Morphine PRN – **no max dose**
• Sedation for patients suffering Ketamine disinhibition or emergence	
IV	50 mcg/kg – single dose not to exceed 2.5mg Repeated once only – **total max dose 5mg**
• Sedation for all other indications	
IM / IV	***Appropriate Medical Officer consultation and approval required in all situations***

MORPHINE

QAS Drug Class • Narcotic analgesic		**Schedule** • S8 (Controlled drugs)[1]
QAS Presentation • Amp, 10mg/1mL *Morphine*		**QAS Authorised Routes of Administration** • **ACP** - IM & IV • **ICP** - IM, IV & IO
Pharmacology Morphine is a narcotic analgesic that acts on the central nervous system by binding with opioid receptors altering processes affecting pain perception and emotional response to pain. It also combines to cause respiratory depression, decreases in the gag reflex, decreases in the rate of AV node conduction and vasodilation.[10]		
Metabolism By the liver, kidneys and lungs.		
Onset 5 to 10 mins (peak 30 to 60 min) (IM) 2 to 5 mins (peak 20 min) (IV)	**Duration** 1 to 2 hrs	**Half Life (elimination)** 2 hrs
Indications • Significant pain (non cardiogenic) • Cardiogenic chest pain • Autonomic Dysreflexia • Sedation to maintain ETT		
Contraindications • KSAR		
Precautions • Elderly patients • Hypotension • Respiratory tract burns • Respiratory depression **AND/OR** failure • Known addiction to narcotics • Patients on Monoamine Oxidase Inhibitors (MAO's)		
Side Effects • Bradycardia • Drowsiness • Hypotension • Nausea & vomiting • Pin point pupils • Respiratory depression		

Special notes:

1. When Morphine is administered to a hypotensive patient ACPs must call for ICP backup where available.
2. In the setting of the hypotensive adult patient (BP <90mmHg) all Morphine doses are to be no greater than 2.5mg incremental doses IV or 5mg IM.
3. Autonomic Dysreflexia is a condition characterised by a massive sympathetic discharge that can occur in association with spinal cord injury or disease. GTN is the first line of treatment for this condition, however Morphine should be considered as part of the management regime if the patient is unresponsive to initial treatment.
4. When administering Morphine and Midazolam to maintain sedation in the intubated patient, appropriate management is to be instituted to address any adverse side effects such as hypotension. The addition of Morphine in this setting will reduce Midazolam requirements, provide analgesia and ultimately decrease the risk of hypotension. Under no circumstances is Morphine and Midazalom to be mixed in the one syringe.
5. Morphine is incompatible with the following QAS authorised IV medications – Phenytoin, Promethazine & Sodium Bicarbonate 8.4%.[8]
6. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ACP

- Significant pain (non cardiogenic)
- Autonomic Dysreflexia

IM	2.5 to 10mg Repeated at up to 5mg every 10 mins until significant reduction in pain or onset of undesirable side effects – **total max dose 20mg**
IV	2.5 to 5mg Repeated at up to 5mg every 5 mins until significant reduction in pain or onset of undesirable side effects – **total max dose 20mg**

- Cardiogenic chest pain

IM	5 to 10mg Repeated at up to 5mg every 10 min intervals until significant reduction in pain or onset of undesirable side effects (only when IV access not achieved) – **total max dose 20mg**
IV	2.5mg Repeated at 2.5mg every 5 min intervals until significant reduction in pain or onset of undesirable side effects – **total max dose 20mg**

PAEDIATRIC DOSAGE – ACP

- Significant pain (non cardiogenic)
- Autonomic Dysreflexia

IM	**≥1 yr**	100 to 200 mcg/kg (single max dose 5mg) – **total max dose 200 mcg/kg**
	<1 yr	***Appropriate Medical Officer consultation and approval required in all situations***
IV	**≥1 yr**	100 mcg/kg (single max dose 2.5mg) Repeated at 50 mcg/kg increments (single max dose 2.5mg) every 5 mins – **total max dose 200 mcg/kg**
	<1 yr	***Appropriate Medical Officer consultation and approval required in all situations***

- Cardiogenic chest pain

NOT APPROVED

ADULT DOSAGE – ICP

- Significant pain (non cardiogenic)
- Cardiogenic chest pain
- Autonomic Dysreflexia

IM	2.5 to 10mg Repeated at up to 5mg every 10 mins – **no max dose**
IV	2.5 to 10mg Repeated at up to 5mg every 5 mins – **no max dose**

- Sedation to maintain ETT

IV / IO	2.5mg - consider administration with Midazolam Repeated PRN – **no max dose**

PAEDIATRIC DOSAGE – ICP

- Significant pain (non cardiogenic)
- Autonomic Dysreflexia

IM	**≥1 yr**	200 mcg/kg (single max dose 5mg) Repeated at 100mcg/kg increments (single max dose 2.5mg) every 10 mins – **no max dose**
	<1 yr	***Appropriate Medical Officer consultation and approval required in all situations***
IV	**≥1 yr**	100 mcg/kg (single max dose 2.5mg) Repeated at 50 mcg/kg increments every 5 mins – **no max dose**
	<1 yr	***Appropriate Medical Officer consultation and approval required in all situations***

- Sedation to maintain ETT

IV / IO	**≥1 yr**	100 mcg/kg (single max dose 2.5mg) - consider administration with Midazolam Repeated PRN – **no max dose**
	<1 yr	***Appropriate Medical Officer consultation and approval required in all situations***

- Cardiogenic chest pain

NOT APPROVED

NALOXONE

QAS Drug Class • Opioid antagonist	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 400mcg/1mL *Naloxone* (Narcan)	**QAS Authorised Routes of Administration** • **ACP** – IM • **ICP** – IM & IV

Pharmacology
Naloxone is an opioid antagonist that prevents or reverses the effects of opioids including respiratory depression, sedation and hypotension. Naloxone antagonises the opioid effects by competing for the same receptor sites.

Metabolism
Hepatic.

Onset	Duration	Half Life (elimination)
3 to 5 min (IM) / 1 to 3 min (IV)	~60 min[10]	60 min

Indications
- Respiratory depression secondary to the administration of narcotic drugs

Contraindications
- KSAR

Precautions
- Use with caution on patients with pre-existing cardiac disease

Side Effects
- Narcotic reversal can cause combativeness, vomiting, sweating, tachycardia and hypertension
- May produce acute withdrawal convulsions in the chronic narcotic user
- Pulmonary oedema

Special notes:
1. Naloxone should only be administered following adequate patient oxygenation and ventilation.
2. Naloxone should be administered cautiously to patients who are known or suspected to be physically dependent on narcotics. This includes newborn infants where the mother is known to be on or suspected of narcotic dependence.
3. In the vast majority of cases Naloxone should not be required and the patient will need only supportive therapy followed by transport to a medical facility.
4. A calculated IM volume of >2mL is required to be administered at different IM sites using separate VanishPoint® syringes.
5. The duration of the narcotic may exceed that of Naloxone and renarcotisation is always a possibility.
6. There is no requirement for IV access in this group of patients unless they have suffered an injury or other medical complications exist.

ADULT DOSAGE – ACP	
• Respiratory depression secondary to the administration of narcotic drugs	
IM	1.6mg – **single dose only**
PAEDIATRIC DOSAGE – ACP	
• Respiratory depression secondary to the administration of narcotic drugs	
IM	20 mcg/kg (single max dose 800mcg) – **single dose only**

ADULT DOSAGE – ICP	
• Respiratory depression secondary to the administration of narcotic drugs	
IM	1.6mg – **single dose only**
IV	50 mcg Repeated PRN to facilitate airway management – **no max dose**
PAEDIATRIC DOSAGE – ICP	
• Respiratory depression secondary to the administration of narcotic drugs	
IM	20 mcg/kg (single max dose 800mcg) – **single dose only**
IV	**NOT APPROVED**

ONDANSETRON

QAS Drug Class • Antiemetic	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 4mg/2mL *Ondansetron* (Zofran)[66]	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IM / IV (QCC/road taskings)

Pharmacology
Ondansetron is a serotonin 5-HT_3 receptor antagonist used primarily as an antiemetic following surgery or chemotherapy. Its effects are thought to be on both peripheral and central nerves. Ondansetron reduces the activity of the vagus nerve, which activates the vomiting center in the medulla oblongata, and also blocks serotonin receptors in the chemoreceptor trigger zone.

Metabolism
The majority of circulating Ondansetron is metabolised by the liver and excreted by the kidneys.

Onset (IV)	Duration	Half Life (elimination)
5 mins	Several hrs	3 to 4 hrs

Indications
- Significant nausea **AND/OR** vomiting
- Prophylactic administration to prevent nausea **AND/OR** vomiting

Contraindications
- KSAR to Ondansetron or other 5-HT_3 receptor antagonists (eg. Dolasetron, Granisetron, Tropisetron & Palonosetron)
- Patients <3 yrs

Precautions
- Hepatic impairment
- Intestinal obstruction

Side Effects
- Headache
- Constipation
- Sensation of warmth or flushing
- Extrapyramidal effects
- Arrhythmias

Special notes:
1. Ondansetron ampoule should be protected from light.[5]
2. Ondansetron may be given in conjunction with or independent of Metoclopramide administration.
3. Ondansetron is incompatible with the following QAS authorised IV medications – Frusemide & Sodium Bicarbonate 8.4%.[8]
4. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP ESoR Aeromedical

- Nausea **AND/OR** vomiting
- Prophylactic administration to prevent nausea **AND/OR** vomiting

IM	4 mg
IV	4mg slow IV push over 2 to 3 mins – **single dose only**

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

- Nausea **AND/OR** vomiting
- Prophylactic administration to prevent nausea **AND/OR** vomiting

IM	**≥3 yrs**	0.1 mg/kg – **max dose 4mg**
	<3 yrs	**NOT APPROVED**
IV	**≥3 yrs**	0.1 mg/kg slow IV push over 2 to 3 mins – **max dose 4mg**
	<3 yrs	**NOT APPROVED**

OSELTAMIVIR (Tamiflu®)

QAS Drug Class • Antiviral	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Cap, 75mg (box of 10) *Oseltamivir* (Tamiflu®)	**QAS Authorised Routes of Administration** • **ACP** / **ICP** – PO

Pharmacology
Oseltamivir (Tamiflu®) is a neuraminidase inhibitor that selectively inhibits the influenza A and B viruses.

Metabolism
Absorbed in the gastro-intestinal tract not affected by food, converted to active metabolite by esterase in the liver and excreted by kidneys.

Onset (PO)	Duration (PO)	Half Life (elimination)
1 hr	<12 hrs	1 to 3 hrs

Indications

Oseltamivir (Tamiflu®) is only to be administered on direct authority of the QAS Medical Director (eg. via Medical Circulars)

- Treatment of QAS operational staff with influenza like illnesses (ILI) characterised by fever (>38°c or have a good history of fever) **and** any one or more of the following: cough, sore throat, runny nose, congestion or gastro-intestinal upset. All staff members must meet the administration criteria according to the "QAS Oseltamivir (Tamiflu®) Administration Check List" prior to being administered Oseltamivir (Tamiflu®).

Contraindications
- As per the QAS Oseltamivir (Tamiflu®) checklist.

Precautions
- Nil

Side Effects
- Nausea / vomiting

Special notes:
1. The patient is to be supplied with the full course of Oseltamivir (Tamiflu®). Treatment should commence as soon as possible, but no later than 48 hours after the onset of fever.
2. The Oseltamivir (Tamiflu®) packaging must be labelled (hand printed by dispensing officer) with the following information:
    a. The name of the person for whom it is intended;
    b. The date the medication is supplied; and
    c. The name, initials, medal number and workplace address of the person supplying the medicine.
    d. The patient must be supplied with the "*Oseltamivir (Tamiflu®) QAS Dosage & Patient Information Form".*

ADULT DOSAGE (OPERATIONAL STAFF ONLY) – ACP / ICP

- Treatment of QAS operational staff with influenza like illnesses (ILI) characterised by fever (>38°c or have a good history of fever) **and** any one or more of the following: cough, sore throat, runny nose, congestion or gastro-intestinal upset. All staff members must meet the administration criteria according to the "QAS Oseltamivir (Tamiflu®) Administration Check List" prior to being administered Oseltamivir (Tamiflu®).

PO	75mg cap twice a day for 5 days

PAEDIATRIC DOSAGE – ACP / ICP

NOT APPROVED

QAS Oseltamivir (Tamiflu®) Administration Check List

(Ver 1.1.0)

PATIENT DETAILS (OPERATIONAL STAFF MEMBER WITH INFLUENZA LIKE ILLNESS)			
Surname		**Given name**	
DOB		**Medal #**	
Region		**Station**	
Address			
Home phone		**Mobile**	
Date assessed		**Case #**	

CHECKLIST – If the patient answers FALSE to any of the following statements do NOT administer Oseltamivir (Tamiflu®) – please contact the QAS Medical Director immediately for further advice.	**True**	**False**
I currently have a fever (>38°c) or have a good history of fever.		
I currently have one or more of the following symptoms:- • Cough; • Sore throat; • Runny nose; • Congestion; or • Gastro-intestinal upset		
I have had influenza symptoms for <48 hours.		
I have no known allergies or adverse reactions to antiviral medication.		
I have no history of fructose intolerance.		
I have no known history of kidney failure.		
I am not pregnant.		
I am not breastfeeding.		

If the patient has answered **TRUE** to all of the above questions the patient is to be administered Oseltamivir (Tamiflu®) as per the QAS Drug Therapy Protocol.

I certify that the information provided by me is correct to the best of my knowledge.

If I have answered **TRUE** to all of the above statements and understand I will be supplied with a 5 day course of Oseltamivir (Tamiflu®) by the Queensland Ambulance Service.

(cross out if not applicable)

OR

I understand that if I answered **FALSE** to any of the above statements I need to obtain advice (see below) from the QAS Medical Director Dr Rashford before being administered Oseltamivir (Tamiflu®).

(cross out if not applicable)

Advice provided by Dr Rashford *(insert advice provided)*	
Recipient signature	**X**……

ADMINISTERING PARAMEDIC DETAILS			
Medal #		Name	
Signature			

Department of Community Safety is collecting your personal information for patient safety and medical records purposes. The collection of this information is authorised by the Queensland Ambulance Service, Medical Director. For further information about privacy and other uses and disclosures of your personal information, refer to the Department's Privacy Plan as amended from time to time, available on the Department's website.

COMPLETED FORMS MUST BE FAXED TO THE OFFICE OF THE MEDICAL DIRECTOR ON (07) 3247 8640

Oseltamivir (Tamiflu®)

QAS Dosage & Patient Information Form

PATIENT (OPERATIONAL STAFF MEMBER RECEIVING MEDICATION)			
Surname		**Given Name**	
DOB		**Medal #**	
Region		**Station**	
Home Address			
Home Phone		**Mobile**	

Patient Information

Oseltamivir (Tamiflu®) is an antiviral drug that is used to treat influenza or influenza like illness (ILI). It works by preventing new viruses being released from infected cells in the nose and throat. It prevents further spread of the virus in the body.

When used as treatment, the drug should be started as soon as possible and within 48 hours of onset of the initial symptoms of influenza. Oseltamivir (Tamiflu®) is known to reduce the duration and severity of ILI.

Dosage

Your recommended dose is 75 mg capsule twice a day for 5 days (with or without food).

How is Oseltamivir taken?

Oseltamivir (Tamiflu®) is administered to adults as an oral capsule.

Are there any side effects?

Nausea and vomiting can occur, especially following the first dose. Headache, abdominal pain, fatigue and insomnia (inability to sleep) are also occasionally reported and are usually not severe. Allergic reactions occur very rarely and rare reports of inflammation of the liver have been reported in patients with influenza-like illness receiving Oseltamivir (Tamiflu®) .

Oseltamivir (Tamiflu®) has received a B1 categorisation of risk of drug use in pregnancy. It is not known whether Oseltamivir (Tamiflu®) passes into breast milk.

Should I see my General Practitioner?

Yes, all people who have been administered Oseltamivir (Tamiflu®) should make arrangements to see their General Practitioner.

TO BE LEFT WITH THE PATIENT

QAS Drug Class • Gas	**Schedule** • Unscheduled[1]
QAS Presentation • Cylinder, ~450 litres (C size) *Medical Oxygen* • Cylinder, ~1600 litres (D size) *Medical Oxygen*	**QAS Authorised Routes of Administration** • **FR** / **S1** / **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** – INH a. Nasal cannula b. Simple face mask c. Non re-breather (reservoir mask) d. Bag valve mask resuscitator e. LMA f. ETT

Pharmacology
A colourless, odourless gas essential for the production of cellular energy that constitutes 21% of the atmosphere.

Metabolism
Not applicable.

Onset	Peak	Half Life (elimination)
Immediate	Not applicable	Not applicable

Indications
- Treatment of hypoxaemia/hypoxia
- To assist organ oxygenation in patients with poor perfusion

Contraindications
- Known paraquat poisoning – no supplemental O_2 should be given
- Lung disease secondary to bleomycin therapy

Precautions
- Prolonged administration to premature neonates
- High concentrations given to COAD patients with hypoxic drive

Side Effects
- Hypoventilation in some COAD patients with hypoxic drive
- Drying of the mucous membrane of the airway

Special notes:
1. Administration of therapeutic oxygen must not be discontinued when moving a patient (eg. from ambulance vehicle into the emergency department).

ADULT DOSAGE – FR / S1 / S2 / S3 / P1 / P2 / ACP / ICP

- Treatment of hypoxaemia/hypoxia
- To assist organ oxygenation in patients with poor perfusion

INH	PRN

PAEDIATRIC DOSAGE - FR / S1 / S2 / S3 / P1 / P2 / ACP / ICP

- Treatment of hypoxaemia/hypoxia
- To assist organ oxygenation in patients with poor perfusion

INH	PRN

PACKED RED BLOOD CELLS

QAS Drug Class • Haemoglobin replacement		**Schedule** • Unscheduled[1]
QAS Presentation • 200 to 400 mL bag, Group O neg PRB cells		**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV inf
Pharmacology • Replaces lost haemoglobin aiming to improve oxygen carrying capacity of blood, volume replacement.		
Metabolism Not applicable.		
Onset (IV inf) Immediate	**Duration (IV inf)** Variable	**Half Life (elimination)** Not applicable
Indications • Ongoing haemodynamic instability secondary to haemorrhage (only following an appropriate volume resuscitation strategy) **AND** the patient meeting the criteria according to the QAS Blood Administration Check List.		
Contraindications • Non consenting conscious patient (eg. Jehovah Witness)		
Precautions • Previous transfusion reaction • Immunosuppressed patients • Hyperkalaemia[67]		
Side Effects • Acute haemolytic transfusion reaction • Acute febrile transfusion reaction • Anaphylaxis/allergic reactions • Infection (bacterial, viral including low risk for HIV, Hep C and other blood borne viruses) • Fluid overload • Acute lung reaction • Electrolyte imbalances[67] • Hypothermia • Acidosis • Hypocalcaemia		

Special notes:

1. Each unit contains enough haemoglobin to raise the haemoglobin concentration in an average size adult by approximately 10g/L.
2. Packed RBC should be mixed thoroughly by gentle inversion before use and then transfused through an intravenous line approved for blood administration incorporating a standard 170-200 micron filter.
3. An external pressure device should only be used in an emergency situation and with a large gauge venous access needle.
4. Medications should not be added to the blood bag or transfusion line. If drugs need to be administered via the same infusion line – the transfusion is to be ceased and the line flushed with Sodium Saline 0.9%.
5. Patients receiving transfusions shall be monitored for signs of the potential complications of transfusions and any suspected problems dealt with swiftly and efficiently. Severe reactions are most likely to occur within the first 15 min of the start of each component. Patients should be most closely observed during this period. If any reaction occurs cease infusion immediately and discuss with Clinical Coordinator. Clinical presentation of transfusion reactions includes tachycardia, hypertension, fever, rigors, headache, myalgia, altered level of consciousness, bronchospasm, pulmonary oedema, and worsening coagulopathy.[68]
6. Vital signs (temperature, pulse, respirations and blood pressure) shall be measured and recorded at the beginning and during each transfusion at a minimum of 15 minutely intervals.
7. The bag numbers of all Packed RBC transfusions administered to the patient must be recorded on the e-ARF.
8. All transfusion reactions must be immediately reported to the QAS Medical Director.
9. All completed Packed RBC bags are to be left with the medical/nursing staff at the receiving hospital.

Special notes (cont):

10. Transfusion of red cells that have been stored for greater than 2 weeks has been associated with significantly increased risk of post-operative complications as well as reduced short term and long term survival in cardiac surgery patients.[69]
11. Informed consent for transfusion means a dialogue has occurred between the patient and the clinician. The significant risks, benefits and alternatives to transfusion including the patient's right to refuse the transfusion will have been discussed. As a result of the discussion the patient should:
    a. Understand what medical action is recommended.
    b. Be aware of the risks and benefits associated with the transfusion
    c. Appreciate the risks, and possible consequences of not receiving the recommended therapy
    d. Be given an opportunity to ask questions
    e. Give consent for the transfusion.[68]

ADULT DOSAGE – ICP ESoR Aeromedical

- Ongoing haemodynamic instability secondary to haemorrhage (only following an appropriate volume resuscitation strategy) - the patient must meet the criteria according to the QAS Blood Administration Check List

IV inf	***QCC consultation and approval required in all situations*** 1 bag of Packed RBC (O negative) Repeated as required in addition to crystalloid fluid resuscitation whilst the patient is haemodynamically unstable due to ongoing blood loss. Every attempt should be made to minimize the amount of fluid resuscitation administered whilst rapidly transporting the patient to definitive surgical care in keeping with current advanced trauma life support guidelines.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

- Ongoing haemodynamic instability secondary to haemorrhage (only following an appropriate volume resuscitation strategy) - the patient must meet the criteria according to the QAS Blood Administration Check List

IV inf	***QCC consultation and approval required in all situations*** 10 mL/kg of Packed RBC (O negative) Repeated as required **(total max dose 1 bag**) in addition to crystalloid fluid resuscitation whilst the patient is haemodynamically unstable due to ongoing blood loss. Every attempt should be made to minimize the amount of fluid resuscitation administered whilst rapidly transporting the patient to definitive surgical care in keeping with current advanced trauma life support guidelines.

QAS Packed RBC Administration Check List

(Ver 1.1.0)

PATIENT DETAILS			
Surname		**Given name**	
DOB		**Case #**	

CHECKLIST – If the patient answers FALSE to any of the following statements do NOT administer QAS Trauma blood (Packed RBC -O negative).	**Yes**	**No**
The Packed Red Blood Cells have been: • Removed from a controlled fridge within the last 4 hours; and • been appropriately stored in the QAS blood transport esky within acceptable temperature range (1° C - 10° C).		
The Packed Red Blood Cells have been inspected ensuring: • Nil leaks identified at the ports or stems; • nil evidence of unusual discolouration or turbidity; and • nil evidence of large clots.		
The labelling on the Red Blood Cells bag have been inspected ensuring: • The produce is O Rh(D) negative; and • is within the documented expiry date.		
The external label (tag) on the Red Blood Cells bag correlates with the labelling on the Red Blood Cells confirming: • The produce is O Rh(D) negative; • is within the expiry date; and • product number matches.		
The above checks have been completed by 2 people.		
The QCC Clinical Coordinator has been consulted and approves the Packed Red Blood Cells administration **(QAS ICP – ESoR Aeromedical ONLY).**		
Administration order documented below (**QAS ICP – ESoR Aeromedical ONLY).**		
QHealth Pathology form completed in full (to be left with patient).		

If the EsoR Aeromedical officer has completed the above checklist and has answered **YES** to all questions the patient is to be administered the QAS Trauma Blood (Packed RBC – O negative) as per the QAS Packed Red Blood Cell DTP and advice provided by the QCC Clinical Coordinator

Advice provided by Clinical Coordinator *(insert advice provided)*			
ADMINISTERING PARAMEDIC DETAILS			
Medal #		Name	
Signature			
CHECKING PERSONS DETAILS			
Medal #		Name	
Signature			

COMPETED FORMS MUST BE FAXED TO THE OFFICE OF THE MEDICAL DIRECTOR ON (07) 3247 8640

PARACETAMOL

QAS Drug Class • Analgesia		**Schedule** • S2 (Therapeutic poisons)[1]
QAS Presentation • Tab, 500mg *Paracetamol* • Elixir, 120mg/5mL *Paracetamol*		**QAS Authorised Routes of Administration** • **S1** / **S2** / **S3** / **P1** / **P2** / **ACP** / **ICP** - PO
Pharmacology Paracetamol is a *p*-aminophenol derivative that exhibits analgesic and antipyretic activity. It does not possess anti-inflammatory activity.		
Metabolism By the liver, excreted by the kidneys.		
Onset (PO) 10 to 60 mins	**Duration (PO)** 4 hrs	**Half Life (elimination)** ~2 hrs
Indications • Relief of minor pain and fever		
Contraindications • KSAR • Patients <1 month old		
Precautions • Hepatic or renal dysfunction • Patients taking anticoagulant medications		
Side Effects • Nausea		

Special notes:

1. Consider previous doses of paracetamol administered by the patient, parent or guardian.

ADULT DOSAGE – S1 / S2 / S3 / P1 / P2 / ACP / ICP		
• Relief of minor pain and fever		
PO	0.5g to 1g – every 4 hrs (total max dose 4g in 24 hrs)	
PAEDIATRIC DOSAGE – S1 / S2 / S3 / P1 / P2 / ACP / ICP		
• Relief of minor pain and fever		
PO	**≥1 month**	15 mg/kg – **single dose only** (not to be administered within 4 hours of previous Paracetamol administration)
	<1 month	**NOT AUTHORISED**

QAS Drug Class	**Schedule**
• Anticonvulsant	• S4 (Restricted drugs)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Amp, 250mg/5mL *Phenytoin*	• **ICP ESoR Aeromedical** – IV inf (QCC taskings only)

Pharmacology
Phenytoin is an anticonvulsant which also has Class 1B anti-arrhythmic activity. The primary mechanism of action is prevention of repetitive neuronal discharge through inhibition of Na^+ channel activity.

Metabolism
Highly plasma protein bound, metabolites are excreted in the urine, accumulates in endoplasmic reticulum of brain, liver, muscle and fat.

Onset (IV inf)	**Duration (IV inf)**	**Half Life (elimination)**
30 to 60 mins	24 hrs	10 to 15 hrs[10]

Indications
- As a second line anticonvulsant in status epilepticus
- Seizure prophylaxis in certain neurosurgical cases as directed by the receiving Neurosurgeon **OR** QCC Clinical Coordinator[70]

Contraindications
- KSAR or hypersensitivity to Phenytoin
- Cardiac conduction abnormalities on the ECG

Precautions
- Impaired liver function
- Hypotension and/or severe myocardial insufficiency.

Side Effects
- Hypotension
- Bradycardia
- Heart block
- CNS depression
- Nausea and/or vomiting
- Skin rash

Special notes:
1. Patients receiving Phenytoin infusions require close haemodynamic monitoring: ECG, heart rate, blood pressure and respiratory function.
2. All Phenytoin infusions are to be initiated using hospital supplies, Phenytoin will not be carried by the QAS flight team.[4]
3. Phenytoin should be administered into a large vein and flushed thoroughly to avoid phlebitis - IV cannula patency must be confirmed prior to administration.
4. IV inf rate must not exceed 25mg/min[5], severe cardiotoxic reactions and fatalities have been reported with atrial and ventricular conduction depression and VF.
5. Phenytoin is not to be used for the treatment of eclampsia, several large RCTs have demonstrated Magnesium Sulphate is substantially more effective.[71]
6. Phenytoin is incompatible with the following QAS authorised IV fluids/medications – Glucose 5%, GTN, Heparin, Insulin, Lignocaine & Morphine.[8]
7. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ICP ESoR Aeromedical

- As a second line anticonvulsant in status epilepticus
- Seizure prophylaxis in certain neurosurgical cases as directed by the receiving Neurosurgeon **OR** QCC Clinical Coordinator

IV inf	***QCC consultation and approval required in all situations*** Inject 18 mg/kg (rounded down to the nearest 250mg) of Phenytoin into a 100mL bag Sodium Chloride 0.9%. Ensure bag is appropriately labelled.[4] Administer over 60 mins.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

PROMETHAZINE

QAS Drug Class • Antihistamine • Antiemetic		**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 50mg/2mL *Promethazine*		**QAS Authorised Routes of Administration** • **ECP** / **ICP** - IV
Pharmacology Promethazine is a phenothiazine derivative with potent antihistamine and sedative/hypnotic effects. It also has antiemetic, antivertigo, antimotion sickness, anticholinergic effects and local anaesthetic actions. It competitively and reversibly antagonises the effects of histamine at the H_1-receptor sites on effector cells.		
Metabolism Hepatic.		
Onset (IV) 3 to 5 min[10]	**Duration (IV)** 6 to 12 hrs[10]	**Half Life (elimination)** 7 to 14 hrs[10]
Indications • Motion sickness • Nausea **AND** vomiting • Symptomatic rash/moderate allergic reactions		
Contraindications • KSAR • Severe allergy/anaphylaxis • Lactating women • Patients <2 yrs		
Precautions • Concomitant use of other phenothiazines • History of dystonic reactions • May potentiate the effects of alcohol		
Side Effects • Dry mouth • Dizziness • Hypotension • Sedation		

Special notes:

1. Promethazine administration for paediatric patients <2 yrs has been removed from QAS authority due to the potential of fatal respiratory depression.[10]
2. Promethazine may be given for symptomatic rash/moderate allergic reactions associated with Box Jelly Fish Antivenom.
3. ECP & ICP clinicians are to be cognisant of the severe hypotensive and sedative effects of Promethazine, especially in children aged 2 to 16 yrs.
4. If patient experiences pain at the IV site, administration should be ceased immediately and evaluation of possible intra-arterial needle placement should be conducted.
5. Promethazine can cause severe chemical irritation and damage to tissues, regardless of the route of administration. Irritation and damage can also result from perivascular extravasation, unintentional intra-arterial injection, and intraneuronal or perineuronal infiltration. Signs, symptoms, and manifestations of severe tissue irritation include burning, pain, erythema, swelling, severe spasm of distal vessels, thrombophlebitis, venous thrombosis, phlebitis, abscesses, tissue necrosis, and gangrene.[72]
6. Promethazine is incompatible with the following QAS authorised IV medications – Frusemide, Heparin, Hydrocortisone, Morphine, Phenytoin & Sodium Bicarbonate 8.4%.[8] All cannulas and IV lines must be flushed thoroughly with Sodium Chloride 0.9% following each medication administration.

ADULT DOSAGE – ECP

- Motion sickness
- Nausea **AND** vomiting

IV	**≥16 yrs**	***Appropriate MO consultation and approval required in all situations*** 12.5 mg – slow IV push over 1 min – **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]
	<16yrs	**NOT AUTHORISED**

- Symptomatic rash/moderate allergic reactions

IV	***Appropriate MO consultation and approval required in all situations*** 12.5 mg – slow IV push over 1 min – **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]

PAEDIATRIC DOSAGE – ECP

- Motion sickness
- Nausea **AND** vomiting

NOT APPROVED

- Symptomatic rash/moderate allergic reactions

IV	**≥2 yrs**	***Appropriate MO consultation and approval required in all situations*** 250 mcg/kg (max dose 12.5mg) – **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]
	<2 yrs	**NOT APPROVED**

ADULT DOSAGE – ICP

- Motion sickness
- Nausea **AND** vomiting

IV	**≥16 yrs**	12.5 mg – slow IV push over 1 min - **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]
	<16 yrs	**NOT AUTHORISED**

- Symptomatic rash / moderate allergic reactions

IV	12.5 mg – slow IV push over 1 min – **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]

PAEDIATRIC DOSAGE – ICP

- Motion sickness
- Nausea **AND** vomiting

NOT APPROVED

- Symptomatic rash / moderate allergic reactions

IV	**≥2 yrs**	250 mcg/kg (max dose 12.5mg) – slow IV push over 1 min – **single dose only** * Mix with Sodium Chloride 0.9% - concentration must be ≤ 2.5mg/mL.[5]
	<2 yrs	**NOT APPROVED**

SALBUTAMOL

QAS Drug Class	**Schedule**
• ßeta-adrenergic agonist	• S4 (Restricted drugs)[1]
QAS Presentation • Neb, 5mg/2.5mL *Salbutamol* • Amp, 500mcg/1mL *Salbutamol*	**QAS Authorised Routes of Administration** • **S2** / **S3** / **P1** / **P2** / **ACP** – NEB • **ICP** – NEB & IV • **ICP ESoR Aeromedical** – IV inf (QCC tasks only)

Pharmacology
Salbutamol sulphate is a direct acting sympathomimetic agent which mainly effects β_2 –adrenoceptors. As a predominantly β_2 –adrenoceptor stimulant, Salbutamol's bronchodilating action is relatively more prominent than its cardiac effects.

Metabolism
Hepatic with excretion by the kidneys

Onset	**Duration**	**Half Life (elimination)**
2 to 5 mins (NEB) 1 to 3 mins (IV)	16 to 60 mins (NEB) 10 to 20 mins (IV)	1.6 hrs

Indications
- Bronchospasm
- Suspected hyperkalaemia with QRS widening **AND**/**OR** AV dissociation

Contraindications
- KSAR
- Patients <2 yrs

Precautions
- Acute pulmonary oedema
- Ischaemic heart disease

Side Effects
- Anxiety
- Tachyarrhythmia's
- Tremors
- Hypokalaemia and metabolic acidosis

Special notes:
1. Different preparations of Salbutamol are used for nebulised and intravenous routes. The inappropriate administration of nebuliser Salbutamol solution intravenously will cause serious adverse effects.
2. The manufacturer recommends that nebules must be stored within the foil packet and are to be discarded three (3) months after opening. The date that the foil packet is opened should then be clearly marked on the packet. Any remaining nebules should be discarded three (3) months after the foil packaging has been opened.
3. Continuous administration of nebulised Salbutamol resulted in greater improvement on PEF and FEV_1 and a greater reduction in hospital admission, particularly among patients with severe asthma.[73]
4. Cardiac monitoring is required for all patients on Salbutamol infusions.

ADULT DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

• Bronchospasm		
NEB	5mg Repeated PRN – **no max dose**	

PAEDIATRIC DOSAGE – S2 / S3 / P1 / P2 / ACP / ICP

• Bronchospasm		
NEB	**≥2 yrs**	5mg Repeated PRN – **no max dose**
	<2 yrs	**NOT AUTHORISED**

ADULT DOSAGE - ICP

• Bronchospasm	
NEB	5mg Repeated PRN – **no max dose**
IV	250 mcg Repeated at 5 min intervals – **max dose 1mg**
• Suspected hyperkalaemia with QRS widening **and/or** AV dissociation	
NEB	20mg – **single dose only**

PAEDIATRIC DOSAGE – ICP

• Bronchospasm		
NEB	**≥2 yrs**	5mg Repeated PRN – **no max dose**
	<2 yrs	**NOT AUTHORISED**
IV	**≥2 yrs**	5 mcg/kg – single max dose 250mcg Repeated once at 10 mins
	<2 yrs	**NOT AUTHORISED**
• Suspected hyperkalaemia with QRS widening **and/or** AV dissociation		
NOT APPROVED		

ADULT DOSAGE – ICP ESoR Aeromedical

• Bronchospasm	
IV inf	***QCC consultation and approval required in all situations*** Mix 3mg (6mL) of Salbutamol with 44mL of Sodium Chloride 0.9% in a 50mL syringe to achieve a final concentration of 60 mcg/mL. Ensure all syringes are appropriately labelled.[4] Commence infusion at 5 mcg/min (5 mL/hr) and increase by 2.5 mcg/min (2.5 mL/hr) every 3 to 5 minutes as determined by patients respiratory status.

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

QAS Drug Class • Alkalising agent	**Schedule** • Unscheduled[1]
QAS Presentation • Bottle, 100mL *Sodium Bicarbonate 8.4%*	**QAS Authorised Routes of Administration** • ECP – IV • ICP – IV & IO

Mode of Action
Sodium Bicarbonate 8.4% is a hypertonic solution that acts as a buffer. Excess hydrogen ions react with bicarbonate resulting in the formation of carbon dioxide and water. This action assists in restoring plasma pH to within normal ranges.

Metabolism
Metabolised to CO_2 and water.

Onset (IV)	Duration (IV)	Half Life (elimination)
Immediate	Variable	Variable

Indications
- Cardiac arrest:
  a. >15 mins duration
  b. secondary to suspected hyperkalaemia (eg. chronic renal failure)
  c. secondary to tricyclic antidepressant (TCA) overdose
- Significant injury with potential for crush syndrome
- TCA overdose with cardiac rhythm disturbance (prolonged QRS/QT interval) **OR** attributed seizure activity
- Suspected hyperkalaemia with QRS widening **AND/OR** AV dissociation

Contraindications
- Nil

Precautions
- Administration of Sodium Bicarbonate 8.4% in the paediatric resuscitation may worsen respiratory acidosis

Side Effects
- Cerebral oedema
- Congestive heart failure

Special notes:
1. Care must be taken to avoid extravasation into tissues as necrosis may occur.
2. Sodium Bicarbonate 8.4% is incompatible with the following QAS authorised IV medications - Adrenaline, Amiodarone, Calcium Gluconate, Isoprenaline, Magnesium, Midazolam and Ondansetron.
3. All cannulae and IV lines must be flushed thoroughly with Sodium Chloride 0/9% before and following each medication administration.

ADULT DOSAGE – ECP

- Cardiac arrest:
  a. >15 mins duration
  b. secondary to suspected hyperkalaemia
  c. secondary to TCA overdose
- Significant injury with potential for crush syndrome
- TCA overdose with cardiac rhythm disturbance (prolonged QRS / QT interval) **OR** attributed seizure activity
- Suspected hyperkalaemia with QRS widening **AND/OR** AV dissociation

IV	***Appropriate Medical Officer consultation and approval required in all situations*** 100mL – **single dose only**

PAEDIATRIC DOSAGE – ECP

- Cardiac arrest:
  a. >15 mins duration
  b. secondary to suspected hyperkalaemia
  c. secondary to TCA overdose
- Significant injury with potential for crush syndrome
- TCA overdose with cardiac rhythm disturbance (prolonged QRS / QT interval) **OR** attributed seizure activity
- Suspected hyperkalaemia with QRS widening **AND/OR** AV dissociation

IV	***Appropriate Medical Officer consultation and approval required in all situations*** 1 mL/kg – **single dose only**

ADULT DOSAGE – ICP

- Cardiac arrest:
  a. >15 mins duration
  b. secondary to suspected hyperkalaemia
  c. secondary to TCA overdose
- Significant injury with potential for crush syndrome
- TCA overdose with cardiac rhythm disturbance (prolonged QRS / QT interval) **OR** attributed seizure activity
- Suspected hyperkalaemia with QRS widening **AND/OR** AV dissociation

IV / IO	100mL - **single dose only**

PAEDIATRIC DOSAGE – ICP

- Cardiac arrest:
  a. >15 mins duration
  b. secondary to suspected hyperkalaemia
  c. secondary to TCA overdose
- Significant injury with potential for crush syndrome
- TCA overdose with cardiac rhythm disturbance (prolonged QRS / QT interval) **OR** attributed seizure activity
- Suspected hyperkalaemia with QRS widening **AND/OR** AV dissociation

IV / IO	1 mL/kg – **single dose only**

SODIUM CHLORIDE 0.9%

QAS Drug Class • Isotonic crystalloid		**Schedule** • Unscheduled[1]
QAS Presentation • Amp, 10mL *Sodium Chloride 0.9%* • Viaflex plastic container, 1000mL *Sodium Chloride 0.9%*		**QAS Authorised Routes of Administration** **ACP** – IV, IV inf **ICP** – IV, IV inf, IO, IO inf
Mode of Action Sodium chloride 0.9% is an isotonic crystalloid that acts as a vehicle for many parenteral drugs and as an electrolyte replenisher for maintenance or replacement of fluid deficits.		
Metabolism This drug has 100% bioavailability. Excess sodium is predominantly excreted by the kidneys.		
Onset (IV inf) Immediate	**Duration (IV inf)** Variable	**Half Life (elimination)** Not applicable
Indications • Inadequate tissue perfusion/shock (*see special notes # 1 to 8*) • Hypovolaemia • As a flush following IV or IO drug administration • To dissolve and dilute drugs for the purpose of IM, IV or IO administration		
Contraindications • Nil		
Precautions • Patients with acute and/or history of heart failure • Pre-existing renal failure • Uncontrolled haemorrhage (unless associated with severe head injury)		
Side Effects • Excessive administration will result in fluid overload		

Special notes:

1. Use of volume expansion in uncontrolled haemorrhage (without a concurrent traumatic brain injury) may be associated with poor outcomes.[74] Paramedics are to administer the minimum amount of IV fluid required to maintain a radial pulse.
2. Hypotension with a concurrent traumatic brain injury is associated with poor outcomes.[75-76] Paramedics are to administer the minimum amount of IV fluid required to maintain a systolic BP of 100 to 120 mmHg.
3. Excessive fluid infusion may lead to neurogenic pulmonary oedema in the spinal cord injured patient.
4. Too rapid infusion of fluids in a patient without a fluid deficit, or has underlying cardiac problems may cause pulmonary oedema and congestive heart failure.
5. Benefits of fluid infusion must be carefully analysed against concerns with the patient's overall condition.
6. A gentle fluid challenge may be considered for patients with suspected right ventricular infarct (following 12 lead ECG acquisition) and no signs of left ventricular failure (eg. pulmonary oedema).
7. Adult patients must be reassessed after every 250 to 500mL of fluid administration.
8. Paediatric patients must be reassessed after every 10ml/kg of fluid administration.

ADULT DOSAGE – ACP	
• Inadequate tissue perfusion/shock (*see special notes # 1 to 8*) • Hypovolaemia	
IV inf	PRN – titrate according to the indication and patient's physiological response to treatment
• As a flush following IV drug administration	
IV	PRN
• To dissolve and dilute drugs for the purpose of IM or IV administration	
IM / IV	As documented on QAS DTPs

PAEDIATRIC DOSAGE – ACP	
• Inadequate tissue perfusion/shock (*see Special notes # 1 to 8*) • Hypovolaemia	
IV inf	***Appropriate Medical Officer consultation and approval required in all situations*** 10 to 20 ml/kg May be repeated once following assessment of patients needs and physiological response to treatment – **total max dose 40mL/kg**
• As a flush following IV drug administration	
IV	PRN
• To dissolve and dilute drugs for the purpose of IM or IV administration	
IM / IV	As documented on QAS DTPs

ADULT DOSAGE – ICP	
• Inadequate tissue perfusion/shock (*see special notes # 1 to 8*) • Hypovolaemia	
IV / IO inf	PRN – titrate according to the indication and patient's physiological response to treatment
• As a flush following IV or IO drug administration	
IV / IO	PRN
• To dissolve and dilute drugs for the purpose of IM, IV or IO administration	
IM / IV / IO	As documented on QAS DTPs

PAEDIATRIC DOSAGE – ICP	
• Inadequate tissue perfusion/shock (*see special notes # 1 to 8*) • Hypovolaemia	
IV / IO inf	10 to 20 ml/kg May be repeated once following assessment of patients needs and physiological response to treatment – **total max dose 40mL/kg** (further fluid may be administered after appropriate medical consultation and approval)
• As a flush following IV or IO drug administration	
IV / IO	PRN
• To dissolve and dilute drugs for the purpose of IM, IV or IO administration	
IM / IV / IO	As documented on QAS DTPs

TENECTEPLASE

QAS Drug Class	**Schedule**
• Fibrinolytic	• S4 (Restricted drugs)[1]
QAS Presentation	**QAS Authorised Routes of Administration**
• Inj, (powder and solvent) 50mg (10 000 IU) Graduated syringe *Tenecteplase* (Metalyse)	• ICP – IV

Pharmacology

Tenecteplase is a recombinant tissue plasminogen activator (t-PA). It combines to the fibrin component of the thrombus and converts thrombus-bound plasminogen to plasmin, which degrades the fibrin matrix of the thrombus.

Metabolism

Hepatic.

Onset (IV)	**Duration (IV)**	**Half Life (terminal)**
15 min	Several hrs	~2 hrs

Indications

Reperfusion is to be considered for all patients with classic ongoing ischaemic chest pain (atypical chest pain excluded) and ECG criteria suggesting STEMI as demonstrated on a 12-lead ECG **AND** the patient meeting the criteria according to the QAS Coronary Artery Reperfusion Check List and LWI.

Criteria:

a. Ongoing Ischaemic chest pain <6 hrs duration
b. 12-lead ECG with persistent ST-segment elevation of ≥1mm in two contiguous limb leads **AND**/**OR** ST-segment elevation of ≥ 2mm in two contiguous chest leads (V_1-V_6)
c. Normal QRS width (<0.12 seconds) **OR** right BBB identified on 12-lead ECG?
d. Patient is <75 years
e. Systolic BP < 180 (at all times during current acute episode)
f. Diastolic BP < 110 (at all times during current acute episode)
g. GCS = 15

Contraindications

- Known allergy to Tenecteplase, Enoxaparin **or** Clopidogrel (as appropriate)
- Left BBB identified on 12-lead ECG
- Known malignant intracranial neoplasm (primary or secondary)
- Current or history of thrombocytopenia
- Active tuberculosis
- Known structural nervous system disease, in particular a malignant intracranial neoplasm (primary or metastatic)
- Known structural cerebral vascular lesion (e.g. arteriovenous malformation)
- Prior intracranial haemorrhage?
- Ischaemic stroke or Transient Ischaemic Attack (TIA) within last 3 months
- History of significant closed head / facial trauma within last 3 months
- Suspected aortic dissection (including new neurological symptoms)
- History of major trauma or surgery (including laser eye surgery) within last 6 weeks
- Internal bleeding (e.g. Gastrointestinal (GI) / urinary tract bleed) within last 4 weeks
- Active bleeding or bleeding disorder e.g. haemophilia (excluding menses)
- Current use of anticoagulants e.g. Warfarin (excluding Aspirin or Clopidogrel)
- Non-compressible vascular punctures
- Active peptic ulcers, as evidenced by recent malaena within last 6 weeks, or active ongoing symptoms prior to current cardiac event
- Prolonged (> 10 minutes) Cardio Pulmonary Resuscitation (CPR)
- Known pregnancy or delivered within the last 2 weeks
- History of serious systemic disease (advanced/terminal cancer, severe liver or kidney disease)
- Resident of an aged care facility requiring cares with daily living and has a GCS < 15.
- Acute myocardial infarction in the setting of acute trauma

Precautions

- Nil

Side Effects
- Haemorrhage
- Headache
- Nausea & vomiting
- Post-administration dysrhythmias

Special notes:
1. Increased scrutiny and threshold must be applied to patients <35 years due to the increased likelihood of STEMI mimics such as pericarditis in this age group. Paramedics should exercise **extreme** caution and demonstrate a low threshold for waiting to gain a second opinion at the receiving Emergency Department. If doubt exists regarding the diagnosis of STEMI the QAS paramedic is **not** to administer reperfusion therapy.
2. The administration table is to be used to specify the dose of Tenecteplase per kg of weight (to a maximum of 50mg).
3. Tenecteplase should be reconstituted by adding the complete volume of water for injection from the pre-filled syringe to the vial containing the powder for injection. This should be done slowly to avoid foaming. The powder should be reconstituted by swirling gently. The appropriate amount should be withdrawn from the vial for injection.
4. All STEMIs (or cases where there is a STEMI and reperfusion is contraindicated) are to be reported to the Medical Director (24/7) – cases after 12 midnight can be telephoned through the next morning if there were no complications. Additionally, a copy of the 12 lead ECG, eARF and the STEMI Reperfusion Capture Form must be forwarded to :

   Australian Centre for Pre-Hospital Research (Cardiac Reperfusion)
   PO Box 1425
   Brisbane Q 4001

ADULT DOSAGE – ICP

- Reperfusion is to be considered for all patients with classic ongoing ischaemic chest pain (atypical chest pain excluded) and ECG criteria suggesting STEMI as demonstrated on a 12-lead ECG **AND** the patient meeting the criteria according to the QAS Reperfusion Check List and Local Work Instructions.

Criteria:

a. Ongoing Ischaemic chest pain < 6 hrs duration
b. 12-lead ECG with persistent ST-segment elevation of ≥1mm in two contiguous limb leads **AND** / **OR** ST-segment elevation of ≥ 2mm in two contiguous chest leads (V_1-V_6)
c. Normal QRS width (<0.12 seconds) **OR** right BBB identified on 12-lead ECG
d. Patient is < 75 years
e. Systolic BP < 180 (at all times during current acute episode)
f. Diastolic BP < 110 (at all times during current acute episode)
g. GCS = 15

IV

Weight calculated dose (as listed below) administered into a pre-existing IV line containing Sodium Chloride 0.9%[26] over 10 secs.

Patient Weight (kg)	Tenecteplase dose to be administered (mg)	Corresponding volume of reconstituted solution (mL)
<60	30	6
60 to <70	35	7
70 to <80	40	8
80 to <90	45	9
≥90	50	10

PAEDIATRIC DOSAGE – ICP

NOT APPROVED

QAS Coronary Artery Reperfusion Check List

(Version 1.4.4)

PATIENT DETAILS				
Patient Surname			**Given Name**	
Age		**Date**	**Incident Number**	

INDICATIONS – if the answer is NO or UNSURE to ANY of the following, do NOT administer any reperfusion drugs	**Yes**	**No**	**Unsure**
Ongoing ischaemic chest pain < 6 hours duration?			
12-lead ECG with persistent ST-segment elevation ≥ 1mm in at least two contiguous limb leads and/or ≥ 2mm in two contiguous chest leads V_1-V_6?			
Normal QRS width (<0.12 seconds) OR Right BBB identified on 12-lead ECG?			
Patient is < 75 years of age?			
Systolic BP < 180 (at all times during current acute episode)?			
Diastolic BP < 110 (at all times during current acute episode)?			
GCS = 15?			
CONTRA-INDICATIONS – if the answer is YES or UNSURE to ANY of the following questions, do NOT administer any reperfusion drugs	**Yes**	**No**	**Unsure**
Known allergy to Tenecteplase, Heparin, Enoxaparin or Clopidogrel (as appropriate)?			
Left BBB identified on 12-lead ECG?			
Known malignant intracranial neoplasm (primary or metastatic)?			
Current or history of thrombocytopenia?			
Active tuberculosis?			
Known structural nervous system disease, in particular a malignant intracranial neoplasm (primary or metastatic)?			
Known structural cerebral vascular lesion (e.g. arteriovenous malformation)?			
Prior intracranial haemorrhage?			
Ischaemic stroke or TIA within last 3 months?			
History of significant closed head / facial trauma within last 3 months?			
Suspected aortic dissection (including new neurological symptoms)?			
History of major trauma or surgery (including laser eye surgery) within last 6 weeks?			
Internal bleeding (e.g. GI / urinary tract bleed) within last 4 weeks?			
Active bleeding or clotting problem (haemophilia etc), excluding menses?			
Current use of anticoagulants e.g. Warfarin (excluding Aspirin or Plavix)?			
Non-compressible vascular punctures?			
Active peptic ulcer, as evidenced by recent malaena within last 6 weeks, or active ongoing symptoms prior to this cardiac event?			
Prolonged (>10 minutes) CPR?			
Known to be pregnant or delivered within last 2 weeks?			
History of serious systemic disease (e.g. advanced / terminal cancer, severe liver or kidney disease)?			
Resident of an aged care facility requiring cares with daily living and GCS <15?			
Acute myocardial infarction in the setting of acute trauma?			

CONSENT

All patients eligible for reperfusion **MUST** be read the following and, if consent is given, the patient must sign the bottom section of this form.

It is likely that you are suffering a heart attack, and your treatment options include: (*choose one of the following as appropriate*)

- a drug which reduces new clot formation called ENOXAPARIN; **and**
  a clot dissolving drug called TENECTEPLASE; **and**
  a drug called CLOPIDOGREL which will assist in preventing further clot formation.
  (*cross out if not applicable*)

OR

- a drug which reduces new clot formation called HEPARIN; **and**
  a drug called CLOPIDOGREL which will assist in keeping a stent open should a cardiologist perform this procedure at hospital.
  (*cross out if not applicable*)

The sooner you receive these drugs, the lower the risk from the heart attack – which is why it is recommended that the treatment is started as soon as possible. These drugs can cause serious side effects in a small number of patients but the risks attached to this treatment are much less than the likely benefit. I will now give you more details.

(choose the appropriate paragraph)

Enoxaparin/Tenecteplase/Clopidogrel therapy: Treatment at this stage improves the chances of survival by 20-25% but it can sometimes cause serious bleeding. The biggest risk is potentially life-threatening stroke which affects about 1 patient in every 100. Other significant bleeding which is not normally life-threatening can occur in about 4 in 100 patients. Some patients also have allergic reactions and other side effects that do not usually cause any major problem.

Heparin/Clopidogrel therapy: Heparin and Clopidogrel can cause life threatening bleeding, albeit the risk is very small. The administration of these drugs in this setting has been recommended by national and international cardiology bodies.

Medical Records: I give permission for the QAS to access my hospital record for information relating to this procedure.

Patient signature	**X**……

PARAMEDIC DETAILS

I certify that I have completed and read the QAS Coronary Artery Reperfusion Check List and the patient has given / has not given consent for the administration of the approved drugs. (circle appropriate response)

Number		Signature	

Completion

5. Ensure the Patient Details section is completed
6. Complete the Reperfusion Check List
7. Ensure the patient has signed the consent section
8. Complete the Paramedic Details section
9. Make two copies of this form and the 12 lead ECG – keep a copy of each at the station
10. Complete the STEMI Reperfusion Capture Form
11. Attach a copy of the 12 lead ECG, eARF and this form to the STEMI Reperfusion Capture Form and forward to:
    Cardiac Reperfusion
    Australian Centre for Pre-Hospital Research
    PO Box 1425
    Brisbane Q 4001

TIROFIBAN

QAS Drug Class • Glycoprotein IIb/IIIa inhibitor	**Schedule** • S4 (Restricted drugs)[1]
QAS Presentation • Amp, 12.5mg/50mL *Tirofiban* (Aggrastat)	**QAS Authorised Routes of Administration** • **ICP ESoR Aeromedical** – IV inf (QCC taskings only)

Pharmacology
Tirofiban is a glycoprotein (GP) inhibitor that prevents the binding of fibrinogen, von Willebrand factor and other adhesive molecules to the platelet group IIB/IIIA receptor sites, thereby preventing platelet aggregation.

Metabolism
By the liver and excreted in the urine.

Onset (IV inf)	Duration (IV inf)	Half Life (elimination)
Mins	4 to 8 hrs	~ 2hrs

Indications
- Non-ST segment elevation acute coronary syndrome (Non STEAC) / high risk unstable angina prior to percutaneous coronary intervention[77-80]
- Reduction of ischaemic events associated with ACS and prior to PCI[78-81]
- Critical care patients during interfacility transport

Contraindications
- KSAR
- Active bleeding or a history of bleeding diathesis within 30 days
- Concomitant use of Warfarin
- Bleeding disorders
- History of intracranial haemorrhage, neoplasm, arteriovenous malformation or aneurysm
- Aortic dissection or pericarditis
- Uncontrolled hypertension (systolic BP ≥180 **AND/OR** diastolic BP ≥110)

Precautions
- Recent epidural procedure
- Chronic haemodialysis
- History of coagulopathy, platelet disorder or thrombocytopaenia
- Reduced doses required with patients with renal impairment

Side Effects
- Haemorrhage
- Thrombocytopaenia
- Nausea/vomiting
- Rash

Special notes:
1. All Tirofiban infusions are to be initiated using hospital supplies, Tirofiban will not be carried by QAS.[4]
2. At present there is no evidence to support Glycoprotein IIB/IIIA inhibitors with thrombolytic treatment in view of the high risk and incidence of bleeding.[80]
3. Discard any unused Tirofiban preparation after 24 hours.[26]
4. Tirofiban should be used concomitantly with Heparin and Aspirin unless either is contraindicated
5. Thrombocytopaenia may occur in a small number of patients during administration of parental GP IIB/IIIA receptor inhibitors. A decrease in platelet counts to <50,000 /mm3 occurred in <1% of patients in PRISM-PLUS or Gusto-IV-ACS (24 hours) Stopping treatment usually results in a return to normal platelet levels.[80]
6. Reduced dosage is required in patients with severe renal insufficiency (creatinine clearance <30 ml/min). All dose adjustments must be authorised by the QCC Clinical Coordinator.

ADULT DOSAGE – ICP ESoR Aeromedical

- Non-ST segment elevation acute coronary syndrome (Non STEAC) / high risk unstable angina prior to percutaneous coronary intervention
- Reduction of ischaemic events associated with ACS and prior to PCI
- Critical care patients during interfacility transport

IV

Intensive Care Paramedic ESoR – Aeromedical will continue Tirofiban infusions already commenced at hospital, using the same concentration and administration rate already established. This may involve withdrawing the patient's previously mixed and labelled solutions from the referring hospital.

Should the QCC Medical Coordinator request a Tirofiban infusion be commenced, the following procedure is to be undertaken. All Tirofiban infusions are to be initiated using hospital supplies and this medication will not be carried by the QAS flight team.

Withdraw and discard 50mL from a 250mL bag of Sodium Chloride 0.9% or Glucose 5% and replace it with 12.5mg (50mL) of Tirofiban to achieve a final concentration of 50 mcg/mL. Mix well and then transfer directly into 50mL syringes to be administered via syringe drivers. Ensure all syringes are appropriately labelled.[4]

IV infusions are given as a loading dose of 0.4 mcg/kg/min for 30 mins, then as a maintenance infusion of 0.1 mcg/kg/min (see table below).

Patient Weight (kg)	30 minute Loading Dose (infusion) 0.4 mcg/kg/min	Maintenance (infusion) 0.1 mcg/kg/min
46 to 54	24 mL/hr (for 30 mins)	6 mL/hr
55 to 62	28 mL/hr (for 30 mins)	7 mL/hr
63 to70	32 mL/hr (for 30 mins)	8 mL/hr
71 to 79	36 mL/hr (for 30 mins)	9 mL/hr
80 to 87	40 mL/hr (for 30 mins)	10 mL/hr
88 to 98	44 mL/hr (for 30 mins)	11 mL/hr
99 to 104	48 mL/hr (for 30 mins)	12 mL/hr
105 to 112	52 mL/hr (for 30 mins)	13 mL/hr
113 to 120	56 mL/hr (for 30 mins)	14 mL/hr
121 to 128	60 mL/hr (for 30 mins)	15 mL/hr

PAEDIATRIC DOSAGE – ICP ESoR Aeromedical

NOT APPROVED

WATER FOR INJECTION

QAS Drug Class •	**Schedule** • Unscheduled[1]
QAS Presentation • Amp, 20mL *Water for Injection*	**QAS Authorised Routes of Administration** • **ACP** / **ICP** – IM & IV

Pharmacology
Water for Injection is sterile water used to dilute or dissolve drugs.

Metabolism
Not applicable

Onset	Duration	Half Life (elimination)
Not applicable	Not applicable	Not applicable

Indications
- To dissolve and dilute drugs for the purpose of IM, IV or IO administration

Contraindications
- Nil

Precautions
- Nil

Side Effects
- Nil

Special notes:
1. Under no circumstances should Water for Injection to be injected unless it has been used to dissolve or dilute drugs for administration.
2. QAS medications approved for dilution with Water for Injection include:- Ceftriaxone, Hydrocortisone and Ketamine[5] (refer to individual QAS DTPs)

ADULT DOSAGE – ACP / ECP

- To dissolve and dilute drugs for the purpose of IM or IV administration

IM / IV	As documented on QAS DTPs

PAEDIATRIC DOSAGE – ACP / ECP

- To dissolve and dilute drugs for the purpose of IM or IV administration

IM / IV	As documented on QAS DTPs

ADULT DOSAGE – ICP

- To dissolve and dilute drugs for the purpose of IM, IV or IO administration

IM / IV / IO	As documented on QAS DTPs

PAEDIATRIC DOSAGE – ICP

- To dissolve and dilute drugs for the purpose of IM, IV or IO administration

IM / IV / IO	As documented on QAS DTPs

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