APPENDIX 1
MEDICATION FORMULARY

The Medication Formulary is published by the Pre-Hospital Emergency Care Council (PHECC) to enable pre-hospital emergency care practitioners to be competent in the use of medications permitted under the Medicinal Products 7th Schedule (SI 300 of 2014). This is a summary document only and practitioners are advised to consult with official publications to obtain detailed information about the medications used.

The Medication Formulary is recommended by the Medical Advisory Committee (MAC) prior to publication by Council.

The medications herein may be administered provided:

1 The practitioner is in good standing on the PHECC practitioner's Register.
2 The practitioner complies with the Clinical Practice Guidelines (CPGs) published by PHECC.
3 The practitioner is acting on behalf of an organisation (paid or voluntary) that is a PHECC licensed CPG provider.
4 The practitioner is privileged, by the organisation on whose behalf he/she is acting, to administer the medications.
5 The practitioner has received training on, and is competent in, the administration of the medication.
6 The medications are listed on the Medicinal Products 7th Schedule.

The context for administration of the medications listed here is outlined in the CPGs.

Every effort has been made to ensure accuracy of the medication doses herein. The dose specified on the relevant CPG shall be the definitive dose in relation to practitioner administration of medications. The principle of titrating the dose to the desired effect shall be applied. The onus rests on the practitioner to ensure that he/she is using the latest versions of CPGs which are available on the PHECC website www.phecc.ie

Sodium Chloride 0.9% (NaCl) is the IV/IO fluid of choice for pre-hospital emergency care.

Water for injection shall be used when diluting medications, however if not available NaCl (0.9%) may be used if not contraindicated.

All medication doses for patients ≤ 15 years shall be calculated on a weight basis unless an age-related dose is specified for that medication.

The route of administration should be appropriate to the patients clinical presentation. IO access is authorised for Advanced Paramedics for cardiac arrest (or under medical direction).

The dose for paediatric patients may never exceed the adult dose.

Paediatric weight estimations acceptable to PHECC are:

Neonate	3.5 Kg
Six months	6 Kg
One to five years	(age x 2) + 8 Kg
Greater than 5 years	(age x 3) + 7 Kg

Reviewed on behalf of PHECC by Prof Peter Weedle, Adjunct Professor of Clinical Pharmacy, School of Pharmacy, University College Cork.
This version contains 17 medications.

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Amendments to the 2012 Edition

The paediatric age range has been increased to reflect the HSE National Clinical Programme for Paediatrics and Neonatology age profile:

A paediatric patient is defined as a patient up to the eve of his/her 16th birthday (≤ 15 years).

Water for injection shall be used when diluting medications, however if not available NaCl (0.9%) may be used if not contraindicated.

The paediatric weight estimation formulae have been modified.

New Medications introduced;

- Hydrocortisone
- Ticagrelor

Clopidogrel		
HEADING	ADD	DELETE
Indications	ST Elevation Myocardial Infarction (STEMI) if the patient is not suitable for PPCI	Identification of ST Elevation Myocardial Infarction (STEMI)
Usual Dosages	300 mg PO ≥ 75 years	600 mg PO > 75 years
Additional information		Paramedics are authorised to administer Clopidogrel PO following identification of STEMI and medical practitioner instruction

Epinephrine (1:1,000)		
HEADING	ADD	DELETE
Usual Dosages	Auto-injector	EpiPen® Jr

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Ibuprofen

HEADING	ADD	DELETE
Clinical Level	EMT	
Presentation	400 mg tablet	
Description	It is an anti-inflammatory analgesic	It is used to reduce mild to moderate pain
Additional information	Caution with significant burns or poor perfusion due to risk of kidney failure Caution if concurrent NSAIDs use	

Ipratropium Bromide

HEADING	ADD	DELETE
Clinical Level	P	
Administration	CPG: 4/5/6.3.3, 4/5/6.3.4, 4/5/6.7.18	CPG: 5/6.3.2, 5/6.7.5
Usual Dosages	**Paediatric** < 12 years: 0.25 mg NEB ≥ 12 years: 0.5 mg NEB	Paediatric 0.25 mg NEB

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Midazolam Solution

HEADING	ADD	DELETE
Administration	2.5 mg in 0.5 mL pre-filled syringe 5 mg in 1 mL pre-filled syringe 7.5 mg in 1.5 mL pre-filled syringe 10 mg in 2 mL pre-filled syringe	
Indications	Combative with hallucinations or paranoia and risk to self or others	Psychostimulant overdose Hallucinations or paranoia
Usual Dosages	**Seizure:** < 1 year: 2.5 mg buccal 1 year to < 5 years: 5 mg buccal 5 years to < 10 years: 7.5 mg buccal ≥ 10 years: 10 mg buccal	Paediatric: Seizure: 0.5 mg/Kg buccal Psychostimulant overdose: 2.5 mg IV or 5 mg IM (Repeat x 2 prn) Hallucinations or paranoia: 5 mg IV/IM
Additional information	No more than two doses by practitioners. Practitioners should take into account the dose administered by caregivers prior to arrival of practitioner.	The maximum dose of Midazolam includes that administered by caregiver prior to arrival of Practitioner

Naloxone

HEADING	ADD	DELETE
Clinical level	EMT	
Administration	Intranasal (IN). CPG: 6.4.23, 4/5.4.23, 4/5/6.7.5	CPG: 5/6.3.2, 5/6.7.5
Indications	Inadequate respiration and/or ALoC following known or suspected narcotic overdose	Respiratory rate < 10 secondary to known or suspected narcotic overdose
Usual Dosages	**Adult:** 0.8 mg (800 mcg) IN (EMT) **Paediatric:** 0.02 mg/Kg (20 mcg/Kg) IN (EMT)	(Paramedic repeats by one prn)

Nitrous Oxide 50% and Oxygen 50% (Entonox®)

HEADING	ADD	DELETE
Additional information	Caution when using Entonox for greater than one hour for Sickle Cell Crisis	

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Oxygen

HEADING	ADD	DELETE
Contraindications		Paraquat poisoning
Indications	Sickle Cell Disease - 100%	
Additional Information	Caution with paraquat poisoning, administer oxygen if SpO_2 < 92%	

Paracetamol

HEADING	ADD	DELETE
Presentation	250 mg in 5 mL	
Indications	Pyrexia	Pyrexia following seizure for paediatric patients. Advanced Paramedics may administer Paracetamol, in the absence of a seizure for the current episode, provided the paediatric patient is pyrexial and has a previous history of febrile convulsions.
Contraindications	< 1 month old	
Usual Dosages	> 1 month < 1 year - 90 mg PR	< 1 year - 60 mg PR

Salbutamol

HEADING	ADD	DELETE
Administration		Advanced Paramedics may repeat Salbutamol x 3
Usual Dosages	**Adult:** .. (or 0.1 mg metered aerosol spray x 5) Repeat at 5 min prn (**EFRs**: 0.1 mg metered aerosol spray x 2) **Paediatric:** < 5 yrs...(or 0.1 mg metered aerosol spray x 3) ≥ 5 yrs...(or 0.1 mg metered aerosol spray x 5) Repeat at 5 min prn (**EFRs**: 0.1 mg metered aerosol spray x 2)	Adult: Repeat at 5 min prn (APs x 3 and Ps x 1) (EMTs & EFRs: 0.1 mg metered aerosol spray x 2) Paediatric: Repeat at 5 min prn (APs x 3 and Ps x 1) (EMTs & EFRs: 0.1 mg metered aerosol spray x 2)

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Sodium Chloride 0.9%

HEADING	ADD	DELETE
Usual Dosages	**Adult:** **Suspension Trauma, PEA or Asystole:** 20 mL/Kg IV/IO infusion **Adrenal insufficiency:** 1,000 mL IV/IO infusion **Heat-Related Emergency:** 1,000 mL IV/IO infusion **Hypothermia, Sepsis, # neck of femur and Bradycardia:** ...Repeat to max 1 L **Post-resuscitation care:** 1,000 mL IV/IO infusion **Shock from blood loss;** ... to maintain systolic BP of 90 – 100 mmHg **Sickle Cell Crisis:** 1,000 mL IV/IO infusion **# neck of femur, sepsis:** 250 mL IV infusion **Sepsis with poor perfusion:** 500 mL IV/IO infusion **Post partum haemorrhage;** 1,000 mL IV/IO infusion **Paediatric:** **Glycaemic emergency:** 10 mL/Kg IV/IO infusion **Hypothermia:** 10 mL/Kg IV/IO infusion ... Repeat prn x 1 **Adrenal insufficiency, Septic shock, Symptomatic Bradycardia, Asystole/PEA:** 20 mL/Kg IV/IO infusion **Burns:** .... > 1 hour	Adult: Post-resuscitation care: 500 mL IV/IO infusion Shock; 500 mL IV/IO infusion Repeat in aliquots of 250 mL prn to maintain systolic BP of; 100 mmHg (hypovolaemia or septic). 90 – 100 mmHg (head injury GCS > 8) Paediatric: Glycaemic emergency: 20 mL/Kg IV/IO infusion Hypothermia: 20 mL/Kg IV/IO infusion Shock: 20 mL/Kg IV/IO infusion

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LIST OF MEDICATIONS

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CLINICAL LEVEL: 

Medication	Aspirin
Class	Platelet aggregation inhibitor
Descriptions	Anti-inflammatory agent and an inhibitor of platelet function Useful agent in the treatment of various thromboembolic diseases such as acute myocardial infarction
Presentation	300 mg dispersible tablet
Administration	Orally (PO) - dispersed in water, or to be chewed - if not dispersible form (CPG: 5/6.4.10, 4.4.10, 1/2/3.4.10)
Indications	Cardiac chest pain or suspected Myocardial Infarction
Contraindications	Active symptomatic gastrointestinal (GI) ulcer Bleeding disorder (e.g. haemophilia) Known severe adverse reaction Patients < 16 years old
Usual Dosages	**Adult:** 300 mg tablet **Paediatric:** Contraindicated
Pharmacology/Action	Antithrombotic Inhibits the formation of thromboxane A2, which stimulates platelet aggregation and artery constriction. This reduces clot/thrombus formation in an MI.
Side effects	Epigastric pain and discomfort Bronchospasm Gastrointestinal haemorrhage
Long-term effects	Generally mild and infrequent but incidence of gastro-intestinal irritation with slight asymptomatic blood loss, increased bleeding time, bronchospasm and skin reaction in hypersensitive patients.
Additional information	Aspirin 300 mg is indicated for cardiac chest pain regardless if patient is on anticoagulants or is already on Aspirin. If the patient has swallowed an aspirin (enteric coated) preparation without chewing it, the patient should be regarded as not having taken any aspirin; administer 300 mg PO.

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CLINICAL LEVEL: P AP

Medication	Clopidogrel
Class	Platelet aggregation inhibitor
Description	An inhibitor of platelet function
Presentation	300 mg tablet 75 mg tablet
Administration	Orally (PO) (CPG: 5/6.4.10)
Indications	ST Elevation Myocardial Infarction (STEMI) if the patient is not suitable for PPCI
Contraindications	Known severe adverse reaction Active pathological bleeding Severe liver impairment
Usual Dosages	**Adult:** 300 mg PO ≥ 75 years; 75 mg PO **Paediatric:** Not indicated
Pharmacology/Action	Clopidogrel selectively inhibits the binding of adenosine diphosphate (ADP) to its platelet receptor, and the subsequent ADP-mediated activation of the GPIIb/IIIa complex, thereby inhibiting platelet aggregation. Biotransformation of Clopidogrel is necessary to produce inhibition of platelet aggregation. Clopidogrel acts by irreversibly modifying the platelet ADP receptor.
Side effects	Abdominal pain Dyspepsia Diarrhoea
Additional information	If a patient has been loaded with an anti-platelet medication (other than Aspirin), prior to the arrival of the practitioner, the patient should not have Clopidogrel administered.

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CLINICAL LEVEL: EFR EMT P AP

Medication	Epinephrine (1:1,000)
Class	Sympathetic agonist
Description	Naturally occurring catecholamine. It is a potent alpha and beta adrenergic stimulant; however, its effect on beta receptors is more profound.
Presentation	Pre-filled syringe, ampoule or Auto injector (for EMT use) 1 mg/1 mL (1:1,000)
Administration	Intramuscular (IM) (CPG: 5/6.4.15, 4.4.15, 2/3.4.16, 5/6.7.31, 4.7.31, 2/3.7.31)
Indications	Severe anaphylaxis
Contraindications	None known
Usual Dosages	**Adult:** 0.5 mg (500 mcg) IM (0.5 mL of 1: 1,000) **EMT** & (EFR assist patient) 0.3 mg (Auto injector) Repeat every 5 minutes prn **Paediatric:** < 6 months: 0.05 mg (50 mcg) IM (0.05 mL of 1:1 000) 6 months to 5 years: 0.125 mg (125 mcg) IM (0.13 mL of 1:1 000) 6 to 8 years: 0.25 mg (250 mcg) IM (0.25 mL of 1:1 000) > 8 years: 0.5 mg (500 mcg) IM (0.5 mL of 1:1 000) **EMT** & (EFR assist patient): 6 months < 10 years: 0.15 mg (Auto injector) ≥ 10 years: 0.3 mg (Auto injector) Repeat every 5 minutes prn
Pharmacology/Action	Alpha and beta adrenergic stimulant Reversal of laryngeal oedema & bronchospasm in anaphylaxis Antagonises the effects of histamine
Side effects	Palpitations Tachyarrhythmias Hypertension Angina-like symptoms
Additional information	N.B. Double check the concentration on pack before use

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CLINICAL LEVEL: EMT P AP

Medication	Glucagon
Class	Hormone and Antihypoglycaemic
Description	Glucagon is a protein secreted by the alpha cells of the Islets of Langerhans in the pancreas. It is used to increase the blood glucose level in cases of hypoglycaemia in which an IV cannot be immediately placed.
Presentation	1 mg vial powder and solution for reconstitution (1 mL)
Administration	Intramuscular (IM) (CPG: 5/6.4.19, 4.4.19, 5/6.7.32, 4.7.32)
Indications	Hypoglycaemia in patients unable to take oral glucose or unable to gain IV access, with a blood glucose level < 4 mmol/L.
Contraindications	Known severe adverse reaction Phaeochromocytoma
Usual Dosages	**Adult:** 1 mg IM **Paediatric:** ≤ 8 years 0.5 mg (500 mcg) IM > 8 years 1 mg IM
Pharmacology/Action	Glycogenolysis Increases plasma glucose by mobilising glycogen stored in the liver
Side effects	Rare, may cause hypotension, dizziness, headache, nausea & vomiting.
Additional information	May be ineffective in patients with low stored glycogen e.g. prior use in previous 24 hours, alcoholic patients with liver disease. Store in refrigerator Protect from light

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CLINICAL LEVEL: EFR EMT P AP

Medication	Glucose gel
Class	Antihypoglycaemic
Description	Synthetic glucose paste
Presentation	Glucose gel in a tube or sachet
Administration	Buccal administration: Administer gel to the inside of the patient's cheek and gently massage the outside of the cheek. (CPG: 5/6.4.19, 4.4.19, 2/3.4.19, 5/6.7.32, 4.7.32)
Indications	Hypoglycaemia Blood glucose < 4 mmol/L **EFR** – Known diabetic with confusion or altered levels of consciousness
Contraindications	Known severe adverse reaction
Usual Dosages	**Adult:** 10 – 20 g buccal Repeat prn **Paediatric:** ≤ 8 years; 5 – 10 g buccal > 8 years: 10 – 20 g buccal Repeat prn
Pharmacology/Action	Increases blood glucose levels
Side effects	May cause vomiting in patients under the age of five if administered too quickly
Additional information	Glucose gel will maintain glucose levels once raised but should be used secondary to Dextrose to reverse hypoglycaemia. **Proceed with caution:** Patients with airway compromise Altered level of consciousness

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CLINICAL LEVEL: EFR EMT P AP

Medication	Glyceryl Trinitrate (GTN)
Class	Nitrate
Description	Special preparation of Glyceryl trinitrate in an aerosol form that delivers precisely 0.4 mg of Glyceryl trinitrate per spray.
Presentation	Aerosol spray: metered dose 0.4 mg (400 mcg)
Administration	Sublingual (SL): Hold the pump spray vertically with the valve head uppermost Place as close to the mouth as possible and spray under the tongue The mouth should be closed after each dose (CPG: 5/6.3.5, 4.4.10, 5/6.4.10)
Indications	Angina Suspected Myocardial Infarction (MI) EFRs may assist with administration Advanced Paramedic and Paramedic - Pulmonary oedema
Contraindications	SBP < 90 mmHg Viagra or other phosphodiesterase type 5 inhibitors (Sildenafil, Tadalafil and Vardenafil) used within previous 24 hours. Known severe adverse reaction
Usual Dosages	**Adult:** **Angina or MI:** 0.4 mg (400 mcg) Sublingual Repeat at 3-5 min intervals, Max: 1.2 mg (EFRs 0.4 mg sublingual max, assist patient) **Pulmonary oedema;** 0.8 mg (800 mcg) sublingual Repeat x 1 **Paediatric:** Not indicated
Pharmacology/Action	**Vasodilator** Releases nitric oxide which acts as a vasodilator. Dilates coronary arteries particularly if in spasm increasing blood flow to myocardium. Dilates systemic veins reducing venous return to the heart (pre load) and thus reduces the heart's workload. Reduces BP.
Side effects	Headache Transient Hypotension Flushing Dizziness
Additional information	If the pump is new or has not been used for a week or more, the first spray should be released into the air.

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CLINICAL LEVEL: P AP

Medication	Hydrocortisone
Class	Corticosteroid and anti-inflammatory
Description	Hydrocortisone is a potent corticosteroid with anti-inflammatory properties
Presentation	Powder and solvent for solution for injection or infusion. Vial containing off-white powder and vial containing water for injections. Prepare the solution aseptically by adding not more than 2 mL of Sterile Water for Injections to the contents of one 100 mg vial, shake and withdraw for use.
Administration	Intravenous (IV) infusion Intramuscular (IM) The preferred route for initial emergency use is intravenous (CPG: 4/5/6.3.3, 4/5/6.3.4, 5/6.4.13, 5/6.4.15, 4/5/6.7.12, 5/6.7.30, 5/6.7.31)
Indications	Severe or recurrent anaphylactic reactions Asthma refractory to Salbutamol and Ipratropium Bromide Exacerbation of COPD (Advanced Paramedic) Adrenal insufficiency (Paramedic)
Contraindications	No major contraindications in acute management of anaphylaxis
Usual Dosages	**Adult:** **Anaphylactic reaction and Exacerbation of COPD (AP):** 200 mg IV (infusion in 100 mL NaCl) or IM **Asthma (AP):** 100 mg IV (infusion in 100 mL NaCl) **Adrenal insufficiency (P & AP):** 100 mg IV (infusion in 100 mL NaCl) or IM **Paediatric:** **Anaphylactic reaction (AP);** < 1 year 25 mg IV (infusion in 100 mL NaCl) or IM 1 to 5 years 50 mg IV (infusion in 100 mL NaCl) or IM > 5 years 100 mg IV (infusion in 100 mL NaCl) or IM **Paediatric: Asthma (AP);** < 1 year 25 mg IV (infusion in 100 mL NaCl) 1 to 5 years 50 mg IV (infusion in 100 mL NaCl) > 5 years 100 mg IV (infusion in 100 mL NaCl) **Adrenal insufficiency (P & AP);** 6 mths to ≤ 5 years: 50 mg IV (AP) (infusion in 100 mL NaCl) or IM (P) > 5 years : 100 mg IV (AP) (infusion in 100 mL NaCl) or IM (P)
Pharmacology/Action	Potent anti-inflammatory properties and inhibits many substances that cause inflammation

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CLINICAL LEVEL: P AP

Medication	Hydrocortisone
Side effects	CCF, hypertension, abdominal distension, vertigo, headache, nausea, malaise and hiccups
Long-term side effects	Adrenal cortical atrophy develops during prolonged therapy and may persist for months after stopping treatment
Additional information	Intramuscular injection should avoid the deltoid area because of the possibility of tissue atrophy. Dosage should not be less than 25 mg.

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CLINICAL LEVEL: EMT P AP

Medication	Ibuprofen
Class	Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)
Description	It is an anti-inflammatory analgesic
Presentation	Suspension 100 mg in 5 mL 200 mg tablet, 400 mg tablet
Administration	Orally (PO) (CPG: 4/5/6.2.6, 4/5/6.7.5)
Indications	Mild to moderate pain
Contraindications	Not suitable for children under 3 months Patient with history of asthma exacerbated by aspirin Pregnancy Peptic ulcer disease Known severe adverse reaction
Usual Dosages	**Adult:** 400 mg PO **Paediatric:** 10 mg/Kg PO
Pharmacology/Action	Suppresses prostaglandins, which cause pain via the inhibition of cyclooxygenase (COX). Prostaglandins are released by cell damage and inflammation.
Side effects	Skin rashes, gastrointestinal intolerance and bleeding
Long-term side effects	Occasionally gastrointestinal bleeding and ulceration occurs. May also cause acute renal failure, interstitial nephritis and NSAID-associated nephropathy.
Additional information	If Ibuprofen administered in previous 6 hours, adjust the dose downward by the amount given by other sources resulting in a maximum of 10 mg/Kg. Caution with significant burns or poor perfusion due to risk of kidney failure. Caution if concurrent NSAIDs use.

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CLINICAL LEVEL: P AP

Medication	Ipratropium Bromide
Class	Anticholinergic
Description	It is a parasympatholytic bronchodilator that is chemically related to atropine.
Presentation	Nebuliser Solution 0.25 mg (250 micrograms) in 1 mL
Administration	Nebulised (NEB) mixed with age-specific dose of Salbutamol (CPG: 4/5/6.3.3, 4/5/6.3.4, 4/5/6.7.12)
Indications	Acute moderate asthma or exacerbation of COPD not responding to initial Salbutamol dose.
Contraindications	Known severe adverse reaction
Usual Dosages	**Adult:** 0.5 mg NEB **Paediatric:** < 12 years: 0.25 mg NEB ≥ 12 years: 0.5 mg NEB
Pharmacology/Action	It blocks muscarinic receptors associated with parasympathetic stimulation of the bronchial air passageways. This results in bronchial dilation and reduced bronchial secretions.
Side effects	Transient dry mouth, blurred vision, tachycardia and headache.

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Medication	Midazolam Solution
Class	Benzodiazepine
Description	It is a potent sedative agent. Clinical experience has shown Midazolam to be 3 to 4 times more potent per mg as Diazepam.
Presentation	Ampoule 10 mg in 2 mL or ampoule 10 mg in 5 mL. Buccal liquid 50 mg in 5 mL. Pre-filled syringe 2.5 mg in 0.5 mL. Pre-filled syringe 5 mg in 1 mL. Pre-filled syringe 7.5 mg in 1.5 mL. Pre-filled syringe 10 mg in 2 mL. Pre-filled syringe 10 mg in 1 mL.
Administration	Intravenous (IV). Intraosseous (IO). Intramuscular (IM). Buccal. Intranasal (IN) (50% in each nostril). (CPG: 5/6.4.23, 6.4.29, 5/6.7.33).
Indications	Seizures. Combative with hallucinations or paranoia and risk to self or others.
Contraindications	Shock. Depressed vital signs or alcohol-related altered level of consciousness. Respiratory depression. Known severe adverse reaction.
Usual Dosages	**Adults:** **Seizure or combative patient.** 2.5 mg IV/IO (AP) or 5 mg IM or 10mg buccal or 5 mg intranasal (P & AP) (Repeat x 1 prn) **Paramedic:** IM, buccal or IN only. **Paediatric:** **Seizure:** < 1year: 2.5 mg buccal 1 year to < 5 years: 5 mg buccal 5 years to < 10 years: 7.5 mg buccal ≥ 10 years: 10 mg buccal or 0.2 mg/Kg intranasal or 0.1 mg/Kg IV/IO (Repeat x 1 prn) **Paramedic:** buccal or IN only
Pharmacology/Action	It affects the activity of a chemical that transmits impulses across nerve synapses called Gamma-AminoButyric Acid (GABA). GABA is an inhibitory neurotransmitter. Midazolam works

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Medication	Midazolam Solution *(contd)*
	by increasing the effects of GABA at these receptors.
Side effects	Respiratory depression, headache, hypotension & drowsiness
Additional information	Midazolam IV should be titrated to effect. Ensure oxygen and resuscitation equipment are available prior to administration. No more than two doses by practitioners. Practitioners should take into account the dose administered by carers prior to arrival of practitioner. Contraindications, other that KSAR, refer to non seizing patients.

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Medication	Naloxone
Class	Narcotic antagonist
Description	Effective in management and reversal of overdoses caused by narcotics or synthetic narcotic agents.
Presentation	Ampoules 0.4 mg in 1 mL (400 mcg /1 mL) or pre-loaded syringe
Administration	Intravenous (IV) Intramuscular (IM) Subcutaneous (SC) Intraosseous (IO) Intranasal (IN) (CPG: 6.4.22, 4/5.4.22, 5/6.5.2, 4/5/6.7.11)
Indications	Inadequate respiration and/or ALoC following known or suspected narcotic overdose.
Contraindications	Known severe adverse reaction
Usual Dosages	**Adult:** 0.4 mg (400 mcg) IV/IO (AP) 0.4 mg (400 mcg) IM or SC (P) 0.8 mg (800 mcg) IN (EMT) Repeat after 3 min prn to a Max 2 mg **Paediatric:** 0.01 mg/Kg (10 mcg/Kg) IV/IO (AP) 0.01 mg/Kg (10 mcg/Kg) IM/SC (P) 0.02 mg/Kg (20 mcg/Kg) IN (EMT) Repeat dose prn to maintain opioid reversal to Max 0.1 mg/Kg or 2 mg
Pharmacology/Action	**Narcotic antagonist** Reverse the respiratory depression and analgesic effect of narcotics
Side effects	Acute reversal of narcotic effect ranging from nausea & vomiting to agitation and seizures.
Additional information	Use with caution in pregnancy. Administer with caution to patients who have taken large dose of narcotics or are physically dependent. Rapid reversal will precipitate acute withdrawal syndrome. Prepare to deal with aggressive patients.

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Medication	Nitrous Oxide 50% and Oxygen 50% (Entonox®)
Class	Analgesic
Description	Potent analgesic gas contains a mixture of both nitrous oxide and oxygen.
Presentation	Cylinder, coloured blue with white and blue triangles on cylinder shoulders Medical gas: 50% Nitrous Oxide & 50% Oxygen
Administration	Self-administered Inhalation by demand valve with face-mask or mouthpiece (CPG: 4/5/6.2.6, 5/6.5.1, 4.5.1, 5/6.5.6, 4/5/6.7.5)
Indications	Pain relief
Contraindications	Altered level of consciousness Chest Injury/Pneumothorax Shock Recent scuba dive Decompression sickness Intestinal obstruction Inhalation Injury Carbon monoxide (CO) poisoning Known severe adverse reaction
Usual Dosages	**Adult:** Self-administered until pain relieved **Paediatric:** Self-administered until pain relieved
Pharmacology/Action	**Analgesic agent gas:** - CNS depressant - Pain relief
Side effects	Disinhibition Decreased level of consciousness Lightheadedness
Additional information	Do not use if patient unable to understand instructions. In cold temperatures warm cylinder and invert to ensure mix of gases. Advanced Paramedics may use discretion with minor chest injuries. Brand name: Entonox®. Has an addictive property. Caution when using Entonox for greater than one hour for Sickle Cell Crisis.

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CLINICAL LEVEL: EFR EMT P AP

Medication	Oxygen
Class	Gas
Description	Odourless, tasteless, colourless gas necessary for life.
Presentation	D, E or F cylinders, coloured black with white shoulders. CD cylinder; white cylinder Medical gas
Administration	Inhalation via: High concentration reservoir (non-rebreather) mask Simple face mask Venturi mask Tracheostomy mask Nasal cannulae Bag Valve Mask (CPG: Oxygen is used extensively throughout the CPGs)
Indications	Absent/inadequate ventilation following an acute medical or traumatic event SpO_2 < 94% adults and < 96% paediatrics SpO_2 < 92% for patients with acute exacerbation of COPD
Contraindications	Bleomycin lung injury
Usual Dosages	**Adult:** Cardiac and respiratory arrest or Sickle Cell Crisis; 100% Life threats identified during primary survey; 100% until a reliable SpO_2 measurement obtained then titrate O_2 to achieve SpO_2 of 94% - 98% For patients with acute exacerbation of COPD, administer O2 titrate to achieve SpO_2 92% or as specified on COPD Oxygen Alert Card All other acute medical and trauma titrate O_2 to achieve SpO_2 94% -98% **Paediatric:** Cardiac and respiratory arrest or Sickle Cell Crisis; 100% Life threats identified during primary survey; 100% until a reliable SpO_2 measurement obtained then titrate O_2 to achieve SpO_2 of 96% - 98% All other acute medical and trauma titrate O_2 to achieve SpO_2 of 96% - 98%
Pharmacology/Action	Oxygenation of tissue/organs
Side effects	Prolonged use of O_2 with chronic COPD patients may lead to reduction in ventilation stimulus.
Additional information	A written record must be made of what oxygen therapy is given to every patient. Documentation recording oximetry measurements should state whether the patient is breathing air or a specified dose of supplemental oxygen. Consider humidifier if oxygen therapy for paediatric patients is > 30 minute duration. Caution with paraquat poisoning, administer oxygen if SpO_2 < 92% Avoid naked flames, powerful oxidising agent.

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CLINICAL LEVEL: EMT P AP

Medication	Paracetamol
Class	Analgesic and antipyretic
Description	Paracetamol is used to reduce pain and body temperature
Presentation	Rectal suppository 180 mg, 90 mg and 60 mg Suspension 120 mg in 5 mL or 250 mg in 5 mL 500 mg tablet
Administration	Per Rectum (PR) Orally (PO) (CPG: 4/5/6.2.6, 4/5/6.4.24, 4/5/6.7.5, 4/5/6.7.35)
Indications	Pyrexia Minor or moderate pain (1 - 6 on pain scale) for adult and paediatric patients
Contraindications	Known severe adverse reaction Chronic liver disease < 1 month old
Usual Dosages	**Adult:** 1 g PO **Paediatric:** **PR** (AP) — **PO** (AP, P & EMT) > 1 mth < 1 year - 90 mg PR — 20 mg/Kg PO 1-3 years - 180 mg PR 4-8 years - 360 mg PR
Pharmacology/Action	Analgesic – central prostaglandin inhibitor. Antipyretic – prevents the hypothalamus from synthesising prostaglandin E, inhibiting the body temperature from rising further.
Side effects	None
Long-term side effects	Long-term use at high dosage or over dosage can cause liver damage and less frequently renal damage.
Additional information	Note: Paracetamol is contained in Paracetamol Suspension and other over-the-counter drugs. Consult with parent/guardian in relation to medication prior to arrival on scene. For PR use be aware of modesty of patient, should be administered in presence of a 2nd person. If Paracetamol administered in previous 4 hours, adjust the dose downward by the amount given by other sources resulting in a maximum of 20 mg/Kg.

APPENDIX 1
MEDICATION FORMULARY

CLINICAL LEVEL: EFR EMT P AP

Medication	Salbutamol
Class	Sympathetic agonist
Description	Sympathomimetic that is selective for beta-2 adrenergic receptors
Presentation	Nebule 2.5 mg in 2.5 mL Nebule 5 mg in 2.5 mL Aerosol inhaler: metered dose 0.1 mg (100 mcg)
Administration	Nebuliser (NEB) Inhalation via aerosol inhaler (CPG: 4/5/6.3.3, 4/5/6.3.4, 3.3.4, 5/6.4.15, 4.4.15, 2/3.4.16, 4/5/6.6.10, 4/5/6.7.12, 3.7.12, 5/6.7.31, 4.7.31, 2/3.7.31)
Indications	Bronchospasm Exacerbation of COPD Respiratory distress following submersion incident
Contraindications	Known severe adverse reaction
Usual Dosages	**Adult:** 5 mg NEB (or 0.1 mg metered aerosol spray x 5) Repeat at 5 min prn (EFRs: 0.1 mg metered aerosol spray x 5, assist patient) **Paediatric:** < 5 yrs - 2.5 mg NEB (or 0.1 mg metered aerosol spray x 3) ≥ 5 yrs - 5 mg NEB (or 0.1 mg metered aerosol spray x 5) Repeat at 5 min prn (EFRs: 0.1 mg metered aerosol spray x 2, assist patient)
Pharmacology/Action	Beta-2 agonist Bronchodilation Relaxation of smooth muscle
Side effects	Tachycardia Tremors Tachyarrhythmias High doses may cause hypokalaemia
Additional information	It is more efficient to use a volumizer in conjunction with an aerosol inhaler when administering Salbutamol. If an oxygen driven nebuliser is used to administer Salbutamol for a patient with acute exacerbation of COPD it should be limited to 6 minutes maximum.

APPENDIX 1
MEDICATION FORMULARY

CLINICAL LEVEL: P AP

Medication	Sodium Chloride 0.9% (NaCl)
Class	Isotonic crystalloid solution
Description	Solution of sodium and chloride, also known as normal saline (NaCl)
Presentation	Soft pack for infusion 100 mL, 500 mL & 1,000 mL Ampoules 10 mL
Administration	Intravenous (IV) infusion, Intravenous (IV) flush, Intraosseous (IO) **Paramedic:** maintain infusion once commenced (CPG: Sodium Chloride 0.9% is used extensively throughout the CPGs)
Indications	IV/IO fluid for pre-hospital emergency care
Contraindications	Known severe adverse reaction
Usual Dosages	**ADULT** Keep vein open (KVO) or medication flush for cardiac arrest prn **Crush injury, Suspension Trauma, PEA or Asystole:** 20 mL/Kg IV/IO infusion **Hypothermia:** 250 mL IV/IO infusion (warmed to 40°C approx) Repeat to max 1 L **# neck of femur, sepsis, symptomatic bradycardia:** 250 mL IV infusion **Decompression illness, sepsis with poor perfusion;** 500 mL IV/IO infusion **Shock from blood loss;** 500 mL IV/IO infusion. Repeat in aliquots of 250 mL prn to maintain systolic BP of; 90 – 100 mmHg 120 mmHg (head injury GCS ≤ 8) **Burns;** > 25% TBSA and/or 1 hour from time of injury to ED, 1000 mL IV/IO infusion > 10% TBSA consider 500 mL IV/IO infusion **Adrenal insufficiency, Glycaemic emergency, Heat-related Emergency, Sickle Cell Crisis;** 1,000 mL IV/IO infusion **Anaphylaxis:** 1,000 mL IV/IO infusion, repeat x one prn **Post-resuscitation care:** 1,000 mL IV/IO infusion (at 4°C approx). If persistent hypotension maintain Sys BP > 90 mmHg

APPENDIX 1
MEDICATION FORMULARY

Medication	Sodium Chloride 0.9% (NaCl) *(contd)*
	PAEDIATRIC Keep vein open (KVO) or medication flush for cardiac arrest prn **Glycaemic emergency, Neonatal resuscitation, Sickle Cell Crisis:** 10 mL/Kg IV/IO infusion **Hypothermia:** 10 mL/Kg IV/IO infusion (warmed to 40°C approx). Repeat prn x 1 **Haemorrhagic shock;** 10 mL/Kg IV/IO, repeat prn if signs of inadequate perfusion **Anaphylaxis;** 20 mL/Kg IV/IO infusion, repeat x one prn **Adrenal insufficiency, Crush injury, Septic shock, Suspension Trauma, Symptomatic Bradycardia, Asysotol/PEA:** 20 mL/Kg IV/IO infusion **Post-resuscitation care:** 20 mL/Kg IV/IO infusion if persistent poor perfusion **Burns:** > 10% TBSA and/or > 1 hour from time of injury to ED: 5 – 10 years: 250 mL IV/IO > 10 years: 500 mL IV/IO
Pharmacology/Action	Isotonic crystalloid solution Fluid replacement
Side effects	Excessive volume replacement may lead to heart failure
Additional information	NaCl is the IV/IO fluid of choice for pre-hospital emergency care For KVO use 500 mL pack only

APPENDIX 1
MEDICATION FORMULARY

CLINICAL LEVEL: P AP

Medication	Ticagrelor
Class	Platelet aggregation inhibitor
Description	An inhibitor of platelet function
Presentation	90 mg tablets
Administration	Orally (PO) (CPG: 5/6.4.10)
Indications	Identification of ST Elevation Myocardial Infarction (STEMI) if transporting to PPCI centre
Contraindications	Hypersensitivity to the active substance (Ticagrelor) or to any of the excipients Active pathological bleeding History of intracranial haemorrhage Moderate to severe hepatic impairment
Usual Dosages	**Adult:** Loading dose 180 mg PO **Paediatric:** Not indicated
Pharmacology/Action	Ticagrelor is a selective adenosine diphosphate (ADP) receptor antagonist acting on the P2Y12 ADP-receptor that can prevent ADP-mediated platelet activation and aggregation. Ticagrelor is orally active, and reversibly interacts with the platelet P2Y12 ADP-receptor. Ticagrelor does not interact with the ADP binding site itself, but interacts with platelet P2Y12 ADP-receptor to prevent signal transduction.
Side effects	Common: Dyspnoea, epistaxis, gastrointestinal haemorrhage, subcutaneous or dermal bleeding, bruising and procedural site haemorrhage. Other undesirable effects include intracranial bleeding, elevations of serum creatinine and uric acid levels. Consult SmPC for a full list of undesirable effects.
Additional information	**Special authorisation:** Advanced paramedics and paramedics are authorised to administer Ticagrelor 180 mg PO following identification of STEMI and medical practitioner instruction. If a patient has been loaded with an anti-platelet medication (other than aspirin), prior to the arrival of the practitioner, the patient should not have Ticagrelor administered.