

Differences in Anaphylaxis Treatment

Paramedic

Intensive Care

Specialist

Method

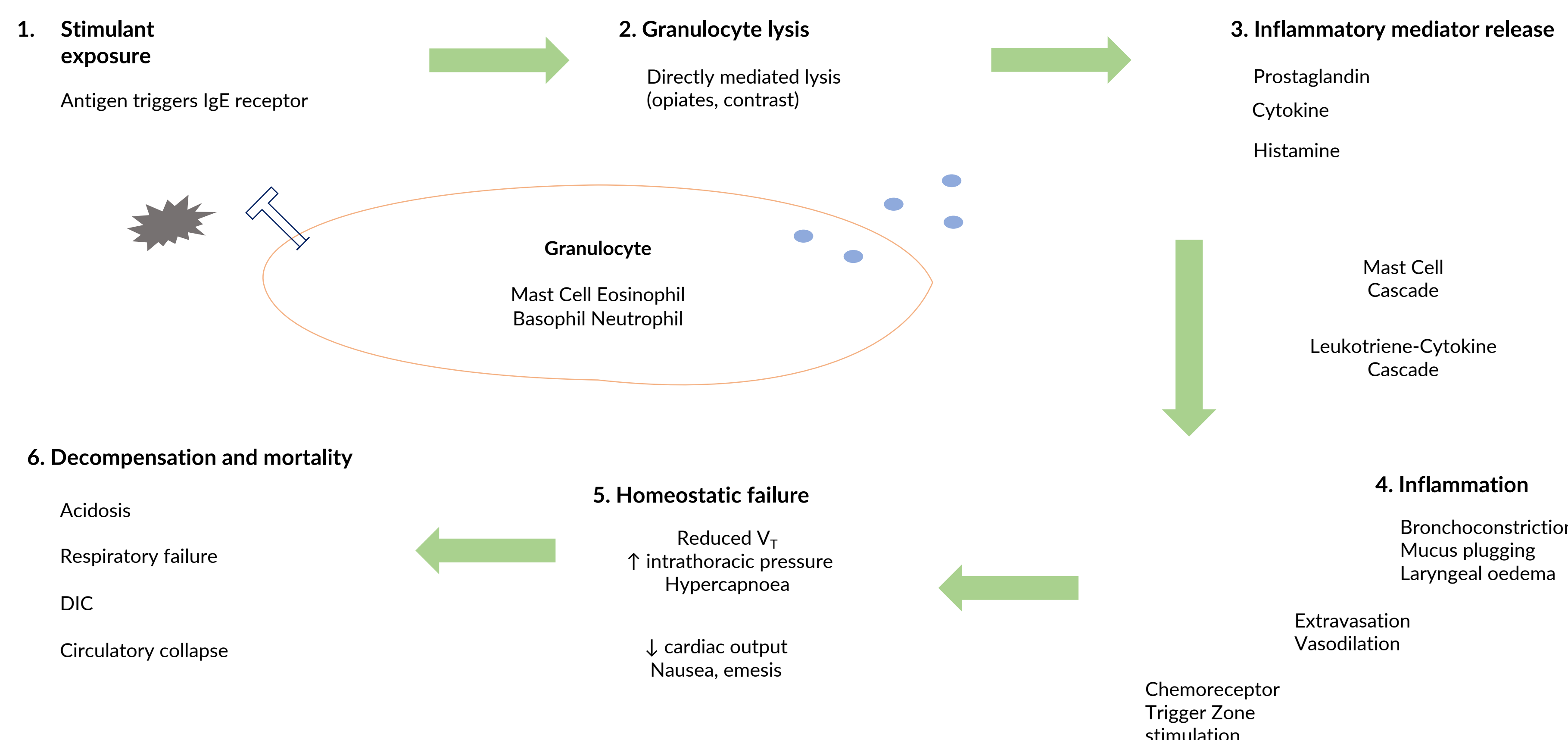
This paper is a descriptive analysis and comparison of a specific and discrete cluster of primary sources. It is the first paper in a new series in the Australasian Journal of Paramedicine outlining treatment variations across jurisdictional services in Australasia. Nine of the ten jurisdictional services have open access Clinical Practice Guidelines (CPGs), and the remaining service was contacted and provided their current CPGs. Content was extracted by three paramedics, with oversight from two senior lecturers in paramedicine. Scope of practice was classified as 'Paramedic' (undergraduate degree, represented by a ✓), 'Intensive Care Paramedic' (postgraduate degree), or 'Specialist' (e.g. Retrievalist). Routine cares were omitted for brevity. A copy of the paper was provided to each service and proofread by 18 paramedics (representing every service) for verification. This comparison does not review the peer-reviewed, published literature to determine current best practice in treatment, no conduct causal comparisons or GRADE analysis. Consequently, no CPG is inferred to be superior or inferior to any other, nor that the most common treatment is necessarily optimal.

Jurisdiction (Service)	Year updated	Pharmacology													Intervention		
		Adrenergic						Anticholinergic		Corticosteroid			Inotrope	Electrolyte	Endotracheal intubation		
		Adrenaline (intramuscular)	Adrenaline (nebulised)	Adrenaline (infusion)	Salbutamol (MDI)	Salbutamol (nebulised)	Salbutamol (infusion)	Ipratropium Bromide (MDI)	Ipratropium Bromide (nebulised)	Hydrocortisone	Dexamethasone	Prednisolone	Glucagon	Magnesium	Unassisted (arrest)	KOBI & IFS	DSI & RSI
Aus. Capital Territory (ACTAS)	2016	✓		ICP	✓			✓							ICP		ICP
New South Wales (NSWA)	2020	✓	✓	ICP	Specialist (1)	✓			✓ (2)			✓ (4)		ICP			
New Zealand (SJNZ)	2019	✓	(3)	ICP							✓ (5)			ICP		ICP	
New Zealand (WFA)	2019	✓	(3)	ICP							✓ (5)			ICP		ICP	
Northern Territory (SJNT)	2013	✓	(3)	ICP (7)	✓ (8)	(3)		✓		✓				ICP	ICP	ICP	
Queensland (QAS)	2021	✓	✓	ICP (9)	✓ (9, 10)	✓ (9, 10)	Specialist (11, 12)		(13)	ICP (9, 10)		✓ (9, 14)		ICP		Specialist (15)	
South Australia (SAAS)	2020	✓	✓	ICP	✓	✓		✓	✓	ICP		✓		ICP		Specialist (16)	
Tasmania (AT)	2018	✓	✓	ICP	✓	✓		ICP (7)		✓		ICP		ICP			
Victoria (AV)	2020	✓	✓	ICP	✓	✓		(6)	✓		✓			ICP		ICP	
Western Australia (SJWA)	2017	✓		ICP (12)	✓	✓								✓		ICP	

DSI = Delayed sequence intubation ICP = Intensive care paramedic IFS = Intubation facilitated by sedation KOBI = Ketamine-only breathing intubation MDI = Metered dose inhaler RSI = Rapid sequence induction

(1) Special Operations Team paramedic only, where nebulised salbutamol is unavailable (2) Only if wheeze persists after administration of salbutamol (3) Indicated for non-anaphylactic reactions or non-life-threatening symptoms (4) In patients on beta blockers who are hypotensive after sodium lactate (5) Indicated for post-anaphylactic itch/rash (6) Not currently carried, however approved for use if available (7) Not a true infusion; repeated intravenous boluses available (8) Introduced during SARS-CoV2 pandemic (9) Indicated for patients refractory to three IM adrenaline injections (10) Indicated for unresolved wheeze (11) Critical Care Flight Paramedic (12) Medical consultation required (13) Not listed on the Anaphylaxis CPG; however, indicated on the relevant drug protocol for bronchospasm (14) Indicated for ongoing hypotension / shock (15) ICP - High Acuity Response Unit only (16) ICP - Retrievalist Flight Paramedic only under medical consultation

Pathology flowchart



Treatment rationale

- Adrenaline**
- Alpha-1 agonism causes peripheral vasoconstriction, improving central organ perfusion
 - Alpha-2 agonism increases glucagon and decreases insulin, raising serum glucose
 - Beta-1 agonism causes positive inotropy, chronotropy, dromotropy, and lusitropy, improving cardiac output and systemic perfusion
 - Beta-2 agonism induces bronchodilation, offsetting obstructive gas trapping and improving tidal volume
 - Beta-3 agonism triggers lipolysis, raising serum glucose
 - Stabilises mast cells, reducing degranulation and release of inflammatory mediators
- Salbutamol**
- Adrenergic preferencing beta-2 receptors, inducing bronchodilation, improving ventilation and reducing intrathoracic pressure
- Ipratropium Bromide**
- Muscarinic cholinergic antagonist, decreasing cGMP, reducing bronchial smooth muscle contraction, improving ventilation and reducing intrathoracic pressure
- Corticosteroids**
- Agonises glucocorticoid or mineralocorticoid receptors respectively, inducing a wide range of changes including reducing inflammation and immunosuppression
- Glucagon**
- Activates glucagon receptors in the myocardium, increasing cAMP, stimulating the inward funny current (increasing pacemaker rate), increasing pacemaker calcium release from the sarcoplasmic reticulum (increasing pacemaker rate), and enhancing calcium-induced-calcium-release (increasing contractility)
- Magnesium**
- Smooth muscle dilator via reduction in calcium-induced-calcium-release (due to competitive ryanodine receptor antagonism), leading to bronchodilation; also induced bronchodilation via additional pathways including reduced mast cell degradation and increased nitric oxide