Differences in Adult Cardiogenic Pulmonary Oedema Treatment

Paramedic | Intensive Care | Extended Care | Specialist

Method

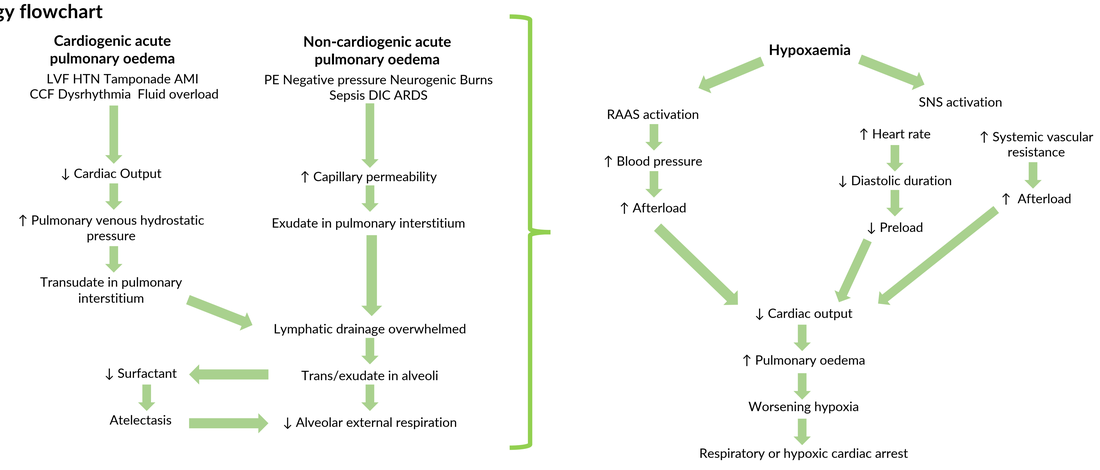
Produced July 2022. This poster is a descriptive analysis and comparison of a specific and discrete cluster of primary sources. All of the ten jurisdictional services have open access Clinical Practice Guidelines (CPGs). Content was extracted by four paramedics, with oversight from two senior lecturers in paramedicine. Scope of practice was classified as 'Paramedic' (undergraduate degree, represented by a ✓), 'Intensive Care Paramedic' (intensive care postgraduate degree), 'Extended Care Paramedic' (primary care postgraduate degree), or 'Specialist' (all other advanced roles, e.g. Retrievalist). Routine cares were omitted for brevity, such as standard Acute Coronary Syndromes or Cardiogenic Shock treatments. This comparison does not review the peer-reviewed, published literature to determine current best practice in treatment. Consequently, no CPG is inferred to be superior or inferior to any other, nor that the most common treatment is necessarily optimal. This resources is created purely to assist making paramedics aware of current Australasian treatment options across JASs.

Jurisdiction (Service)	Pharmacology						Intervention				
	Vasodilators			Loop diuretic	Anxiolytic	Bronchodilators	CPAP	PEEP	Endotracheal intubation		
	Glyceryl Trinitrate (sublingual)	Glyceryl Trinitrate (transdermal)	Glyceryl Trinitrate (infusion)	Furosemide	Opioid				Unassisted (arrest)	KOBI & IFS	DSI & RSI
Aus. Capital Territory (ACTAS)	✓					✓ (e)	✓		ICP	ICP	ICP
New South Wales (NSWA)	✓		Specialist (a, b)	ICP			ICP	ICP	ICP		
New Zealand (SJNZ)	✓	✓	ICP		✓		✓	✓	ICP		ICP
New Zealand (WFA)	✓	✓	ICP		✓		✓	✓	ICP		ICP
Northern Territory (SJNT)	✓	✓		ICP	✓		✓	ICP	ICP		ICP
Queensland (QAS)	✓			Specialist (a, b, c)			✓	✓	ICP		Specialist (g)
South Australia (SAAS)	✓		ICP		(d)		ICP		ICP		Specialist (h)
Tasmania (AT)	✓		ICP	ICP	(d)	✓ (f)	ICP		ICP		
Victoria (AV)	✓	✓	(c)	ICP		✓ (f)	✓	✓	ICP		ICP
Western Australia (SJWA)	✓								✓		ICP

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

(a) Flight Paramedic only (b) Medical consult required (c) Interhospital transfers only where already established (d) Specifically states morphine is contraindicated; no discussion of other anxiolytics / analgesics (e) Post nitrates (f) To be avoided – only indicated if a history of bronchospasm (g) ICP – "High Acuity Response Unit" only (h) ICP – "Retrievalist Flight Paramedic" under medical consultation only

Pathology flowchart



Treatment rationale

Glyceryl Trinitrate

- Forms nitric oxide in the tunica intima, increasing cGMP, decreasing calcium, causing vasodilation. Vasodilation is beneficial in APO for multiple reasons:
  - It reduces pulmonary blood pressure, in turn reducing the hydrostatic capillary pressure driving oedema formation;
  - The decrease in preload and afterload decreases myocardial demand, reducing hypoxic myocardial injury;
  - Coronary artery vasodilation is theorised to increase collateral circulation, further reducing hypoxic injury (unproven, possibly due to coronary steal).

Furosemide

- Loop diuretic, blocking uptake of sodium, potassium, and chlorine in the ascending limb of the loop of Henle.
- The increased filtrate osmotic pressure reduces fluid reabsorption and causes polyuria – this rapid fluid offloading decreases preload and afterload, reducing myocardial demand and pulmonary hydrostatic pressure.

Continuous Positive Airway Pressure (CPAP)

- Increases expiratory resistance, reducing alveolar collapse from atelectasis; this in turn recruits surface area for external respiration, reducing hypoxaemia.
- CPAP has been shown by meta-analysis to reduce both mortality and intubation rates when compared to both standard care or Bi-PAP.

Positive End Expiratory Pressure (PEEP)

- Counteracting pressure on exhalation, also reducing alveolar collapse from atelectasis, pushing fluid out of the alveoli and into interstitial space, and in turn reducing hypoxaemia.
- In the pre-hospital setting, PEEP is most commonly used as an attachment to intermittent positive pressure ventilation in circumstances where a patient is unable to maintain respiratory drive (either RR or V_T) sufficient for CPAP to be effective.

Produced by: Matt Wilkinson-Stokes, Holly Reefman, Eva Cambridge, Henry Waldren, Marc Colbeck, Sonja Maria. Contact: matt.wilkinson-stokes@outlook.com