

## Drowning CoMET Guideline

This guideline is for use by healthcare staff, at CoMET undertaking critical care retrieval, transport and stabilisation of children, and young adults.

CoMET is a Paediatric Critical Care Transport service and is hosted by the University Hospitals of Leicester NHS trust working in partnership with the Nottingham University Hospitals NHS Trust.

The guidance supports decision making by individual healthcare professionals and to make decisions in the best interest of the individual patient.

This guideline represents the view of CoMET, and is produced to be used mainly by healthcare staff working for CoMET, although, professionals, working in similar field will find it useful for easy reference at the bedside.

We are grateful to the many existing paediatric critical care transport services, whose advice and current guidelines have been referred to for preparing this document. Thank You.

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### Education and Training

1. Annual Transport team update training days
2. Workshops delivered in Regional Transport Study days/ Outreach

### Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Incident reporting	Review related Datix	Abi Hill – Lead Transport Nurse <a href="mailto:abi.hill@uhl-tr.nhs.uk">abi.hill@uhl-tr.nhs.uk</a>	Monthly	CoMET Lead Governance Meeting
Documentation Compliance	Documentation Audit	Abi Hill – Lead Transport Nurse <a href="mailto:abi.hill@uhl-tr.nhs.uk">abi.hill@uhl-tr.nhs.uk</a>	3 Monthly	CoMET Lead Governance Meeting

## Drowning CoMET Guideline

### Clinical History

#### Drowning:

Respiratory impairment from submersion or immersion in a liquid

#### Objectives

- Maintain oxygenation, ventilation and circulation
- Minimise secondary brain injury
- Rewarm but avoid hyperthermia

#### Important points to note

- Immersion time
- Cardio/respiratory arrest? Details of timings and resus start
- Mechanism of immersion and other injuries
- Pre-existing medical condition
- Local team refer to social care, child protection +/- police

#### Considerations

Prophylactic Antibiotics have no role they do not improve outcome & should be restricted to patients demonstrating signs of infection, sepsis or when submersion in grossly contaminated water has occurred

### Cardiac arrest

Resuscitation using **APLS Guidelines** (Adjust if hypothermic)

### C-Spine Control

Assume cervical injury until proven otherwise

### Investigations & Biochemistry to consider

- Chest x-ray
- ECG
- Further trauma imaging
- Toxicity Screen
- CT scan/MRI brain
- Blood gas including Glucose
- FBC, U+E, LFT's, Coagulation, CK, serum osmolality
- Sputum culture

### Refer to **CoMET** if:

- Required cardiopulmonary resuscitation and has achieved ROSC
- Ongoing cardiovascular instability
- Signs of respiratory failure (hypoxia, high CO<sub>2</sub> or increased work of breathing)
- Abnormal blood gases on arrival
- Reduced or altered level of consciousness
- Hypothermia

### Clinical Signs

- Respiratory compromise
- Evidence of hypoxic brain injury
- Signs of trauma (head and cervical spine)
- Hypothermia
- Cardiac arrhythmia
- Rhabdomyolysis from shivering

## Rewarming

### Warm if core temperature <30°C

Hypothermia slows metabolism, reduces oxygen consumption and the inflammatory response.

Hypothermia in a cardiac arrest situation in drowning is usually secondary to the arrest and not the immersion. Prolonged, profound hypothermia may make resuscitation and rewarming impossible.

Rewarm rapidly to 32 degrees and then **0.5°C per hour to 35°C**. Measure central temperature (rectal or oesophageal).

#### External measures -

- Remove wet clothes and increase room temperature. Apply warm blankets, forced air blankets (Bair hugger) or transwarmers

#### Invasive measures –

- Warmed intravenous fluids (38°C-40°C), warm humidified gases via the ventilator, bladder/pleural/gastric lavage, haemo-filtration or ECMO

### Airway/Breathing

- 15 l/min O<sub>2</sub> via non re-breath mask (sats target >94%)
- Insert NG tube (have on free drainage)
- Consider antibiotics (not routinely given)
- CXR may be normal initially
- Can trial NIV/HFNCO<sub>2</sub> if signs of respiratory distress
- May require intubation for respiratory failure or to allow post cardiac-arrest care
- Initial settings - PEEP 8, Vt 6-8 ml/kg and limit PIP <30
- Monitor end tidal CO<sub>2</sub> and blood gases
- Risk of ARDS (high FiO<sub>2</sub>) – **Re-discuss with CoMET consultant** who may try increased PEEP (10-12cmH<sub>2</sub>O), increased Ti or proning



### Circulation

- Obtain IV/IO Access x 2 +/- arterial line

Summary of resus in hypothermia:

- **<30°C - NO** Adrenaline or Amiodarone and **MAXIMUM 3** shocks.
- **30°C-35°C-** Defibrillate as usual, resus drugs every 8 minutes. Continue CPR until >32°C or temperature has not risen despite active rewarming
- Arrhythmias are common and may require treatment (discuss with CoMET consultant)
- Hypotension - treat with fluid bolus' (20ml/kg Plasmalyte 148) and consider inotropic support
- If inotropic support is required always deliver via IO or central line due to accumulation in peripheral circulation in the hypothermic child.
- Insert urinary catheter to monitor urine output and fluid balance



### Disability

- Assess GCS, neurology and pupil size/reaction
- C-spine protection until cleared
- **NB. Reduced GCS may not always be due to drowning it is important to exclude other causes**
- If intubated and ventilated provide adequate sedation and neuromuscular blockade
- **If CPR > 1 minute + comatose + ventilated → Neuro protect** (30° head up tilt, EtCo<sub>2</sub> target 4.5-5 kPa, SpO<sub>2</sub> >94%, normoglycaemia, Hb > 80)
- Load with prophylactic Keppra (40mg/kg)
- Perform CT head scan
- If signs of raised ICP – discuss with **CoMET consultant**. First line - 2.7% sodium chloride (3-5mls/kg over 30 mins) aiming for sodium between 145-150mmol/l. Repeated doses can be used.

## **References**

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