CARDIAC ARREST
IN
SPECIAL CIRCUMSTANCES 1

Objectives

To understand how resuscitation techniques should be modified in the special circumstances of:

- Hypothermia
- Immersion and submersion
- Poisoning

- Pregnancy
- Electrocution
- Anaphylaxis
- Acute severe asthma
- Trauma

Special Circumstances

- Common cause of cardiopulmonary arrest in younger age group
- Cardiac arrest often preventable
- Suitable patients may require a prolonged period of resuscitation

Hypothermia

Definition: Core temp < 35 °C
(low reading thermometer)

- Mild 32 - 35 °C
- Moderate 30 - 32 °C
- Severe < 30 °C

Hypothermia

Special problems of:

- Immersion
- Elderly
- Very young
- Injury/illness
- Drugs/alcohol

Clinical Features of Hypothermia

- Pulse: slow, irregular, small volume
- BP: ↓ or unrecordable
- Pupils: dilated
- CNS: depressed conscious level, coma

Primary versus secondary hypothermia?

Caution

- The clinical features of hypothermia can mimic death
- Cerebral protective effect
- ‘Not Dead until Warm and Dead’, except:
  - obvious lethal injuries
  - body so frozen - resuscitation impossible
  - in-hospital - clinical judgement

Airway and breathing

- Warm (40-46 °C), humidified, high concentration oxygen
- Tracheal intubation as indicated on ALS algorithm with care
- Ventilation to make chest rise visibly

Circulation

- Beware extreme bradycardia
- Consider use of Doppler probe
- Oesophageal temperature
- ↑Chest wall stiffness
- Central or large proximal veins

Arrhythmias associated with hypothermia

Sinus bradycardia

Atrial fibrillation

Ventricular fibrillation

Asystole

Temp

Circulation

- Defibrillation may not be successful until core temp >30°C
- Other arrhythmias spontaneously improve with warming alone
- Reduced efficacy of drugs < 30 °C
- Bradycardia may be physiological in severe hypothermia

Rewarming

- Remove from cold environment
- Movement may precipitate arrhythmias
- Prevent further heat loss
- Rapid transfer to hospital
- Remove cold/wet clothing

Active Rewarming

External

- Forced air warming blankets

Internal (core)

- Cardiopulmonary bypass
- Ventilation with warm humidified 0_2
- Warm i.v. fluids (40 ºC)
- Gastric, peritoneal, pleural, bladder lavage
- Continuous veno-venous haemofiltration

Monitoring and investigations

- Continuous haemodynamic monitoring
- Repeated arterial blood gas analysis
  - do not use temperature correction
- Electrolytes
  - hyperkalaemia during rewarming
- Thyroid function (elderly)

Immersion and Submersion

- Immersion - head above water
  - –hypothermia
  - –cardiovascular instability
- Submersion - head below water
  - –asphyxiation
  - –hypoxia - secondary cardiac arrest
- Drowning - death within 24 hours of submersion event

Decision to resuscitate

- Full recovery possible even after prolonged immersion
- High risk of hypothermia if water temperature < 25ºC
- Submersion related to epilepsy or alcohol?

Rescue from water

- Minimise risks to rescuers
- Consider spinal injury
- Keep patient horizontal
- Do not attempt resuscitation in water unless trained

Airway and breathing

- Caution: possible spinal injury
- Give 100% oxygen
- Do not attempt to ‘drain lungs’
- Vomiting is common
- Early intubation if unconscious
- High risk of ARDS

Circulation

- Beware extreme bradycardia
- Hypovolaemia from squeeze effect
- Intravenous fluids
- Nasogastric tube
- Salt/fresh water unimportant

Investigations

- Arterial blood gas analysis
- Electrolytes
- Glucose
- ECG
- CXR

Further management

If not had cardiac arrest consider discharge after 6 hours observation in hospital ONLY if:

- No clinical symptoms or abnormal clinical signs
- Normal $Pa0_2$ breathing room air
- Normal CXR
- No other worrying symptoms

There is a small risk of late pulmonary oedema

Poisoning and drug intoxication

- A leading cause of death < 40 years
- Most commonly self-poisoning with therapeutic or recreational drugs
- Industrial accidents or warfare:
  - chemical contamination
  - radiation

Resuscitation: Airway

- Decreased conscious level common:
  - airway obstruction
  - respiratory arrest
- Avoid mouth-to-mouth ventilation if:
  - cyanide
  - hydrogen sulphide
  - corrosives
  - organophosphates

Breathing

- High concentration of 0_2 (except paraquat)
- Intubate unconscious patients
- Arterial blood gas analysis
- Rapid sequence induction with cricoid pressure (*expert help required*)

Circulation

- Drug-induced hypotension is common
- Fluid therapy +/- inotropes
- Correct acid-base status
- Cardioversion for life-threatening arrhythmias

Specific therapeutic measures

- Limiting absorption of ingested poisons
  - < 1 hour - gastric lavage & charcoal
- Enhance elimination
  - haemodialysis
  - haemoperfusion
- Specific antidotes

Poisons Information

- National Poisons Information Service
- TOXBASE®
  - Edinburgh NPIS

Specific antidotes

- Paracetamol - N-acetylcysteine
- Organophosphates - Atropine
- Cyanides - Sodium nitrite
  - Sodium thiosulphate
  - Dicobalt edetate
- Digoxin - Fab antibodies
- Opioids - Naloxone

Further Management

- Prolonged coma - rhabdomyolysis
- Electrolytes (K^+) and glucose
- Arterial blood gases
- Temperature

Any Questions?