Risk Factors for Hypothermia in New Zealand

• Geography.
• Climate.
• Increased transit time for emergency services.
• High risk recreational activities.

Why is recognition important?

• It is a potentially reversible condition.
• It complicates the management of trauma.
• It exacerbates the effects of shock.

Definitions

• Mild Hypothermia - A core temperature between 35 & 30°C.
• Severe Hypothermia - A core temperature below 30°C.

Patho-physiology

• Decreased heat production.
• An inadequate adaption to shock from the cardiovascular and respiratory systems.
• Increased bleeding tendency.

Deranged Physiology

• Decreased heart rate.
• Decreased blood pressure.
• Cardiac arrhythmia’s.
• Decreased oxygenation
• Decreased metabolism.
• Depletion of reserves
• Decreased response to drugs.
**Causes**

- Decreased Heat Production.
- Inadequate response to shock.
- Increased bleeding tendency.
- Decreased level of consciousness.

**Any Benefits?**

- Head injury and cerebral anoxia – moderate hypothermia only.
- 114 cases 1988-1996.
- 40% < 32°C.
- 78% associated with trauma.
- 83% males.
- Age range 33 ± 12 years.
- 28% mortality.

**Signs and Symptoms in severe hypothermia**

- Cyanotic, mottled or livid skin.
- Bradycardia (slow pulse).
- Slow and shallow breathing.
- Absence of shivering below about 31°C.
- Confusion progressing to unconsciousness.
- Absent reflexes and dilate pupils.
**Apparent Death**

**Staging of Hypothermia**

- **Stage 1** Clear consciousness with shivering 35 – 32 °C.
- **Stage 2** Impaired consciousness without shivering 32 – 28 °C.
- **Stage 3** Unconsciousness 28 – 24 °C.
- **Stage 4** Apparent death 24 – 15 °C?
- **Stage 5** Death due to irreversible hypothermia <15 °C? (< 9 °C?).

**Assessment in the field - ABCD & E**

- Check airway, pulse and respirations.
- Cardiac monitoring and pulse oximetry desirable.
- Assess tympanic or oesophageal temperature.

**Temperature Monitoring**

- Epitympanic.
- Oesophageal.
- Rectal unreliable especially in the case of peritoneal lavage.
- Core temperature continues to drop after removal from cold environment.

**Pre-hospital treatment - features specific to mountain rescue**

- Stabilise before moving if possible.
- Remove wet clothing.
- Shield from wind.
- Transport in horizontal position by preference.
Hospital treatment – resuscitation + surgery + re-warming

- Specialised retrieval to major hospital.
- Forced - air re-warming.
- Warmed humidified air.
- Oesophageal or peritoneal re-warming.
- Extra-corporeal re-warming of blood.
- Intensive care and definitive surgery for possible injuries.

Extra-corporeal Re-warming

Resuscitation From accidental hypothermia Of 13.7 C° Pre-hospital treatment with circulatory arrest Gilbert, Bosund et al. Lancet 2000

In a victim of very deep accidental hypothermia, 9 hours of resuscitation and stabilisation led to good physical and mental recovery. 1820 hrs, May 20, 1999.

29 year old female skier trapped behind ice:

- T + 49 min: extracted from water.
- T + 69 min: advanced life support.
- T + 3 hrs: arrive base hospital.
- T + 3.5 hrs: on bypass.
- T + 9 hrs: transferred ICU.
- Transferred to own hospital day 28.
- Ventilated total of 35 days.
- Commenced rehabilitation day 60.
- Resumed work, skiing and hiking at 5 months.

Nobody recovered hypothermic from the field is dead, until they are warm and dead.