



Clinical Practice Guidelines: Environmental/Hypothermia

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Date	February, 2021
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Scope	Applies to Queensland Ambulance Service (QAS) clinical staff.
Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
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Hypothermia

February, 2021

Hypothermia is a medical emergency that occurs when body heat is lost faster than it can be produced, resulting in an abnormally low body temperature. Normal body temperature is approximately 37°C and hypothermia is defined as a core body temperature of less than 35°C.^[1] Early compensatory mechanisms of hypothermia include shivering, increasing muscle tone, peripheral vasoconstriction, increased respiratory rate and increased cardiac output. When these mechanisms no longer compensate for heat loss, body temperature falls.^[1-3]

Despite Queensland's warm climate, hypothermia can occur in any season or setting.^[4]

Causes of hypothermia can be classified under **three** (3) broad headings:

Increased heat loss

- vasodilation
- environmental
- trauma
- loss of skin integrity e.g. burns
- neuropathy

Decreased heat production

- extremes of age
- endocrine disorders
- nutritional deficits
- immobility

CNS dysfunction

- trauma
- stroke
- hypoxaemia
- malignancy
- encephalopathy.



Clinical features^[5,6]

Temperature measurements can be inaccurate in hypothermic patients. The following classification system can be used to approximate core temperature, though not all patients reliably exhibit these signs.^[5]

Clinical features depend on the underlying aetiology and core temperature.

Hypothermic stage	Temperature	Clinical assessment
Mild	> 32 – 35°C	<ul style="list-style-type: none">• Apathy/lethargy• Ataxia• Vasoconstriction• Tachycardia• Tachypnoea• Normotension
Moderate	> 28 – 32°C	<ul style="list-style-type: none">• Confusion• ALOC• Bradycardia• Hypotension• Muscle rigidity
Severe	< 28°C	<ul style="list-style-type: none">• Stupor or coma• Diminished or absent signs of life• Apnoea• Dilated pupils• Reduced or absent reflexes• Dysrhythmias

- **Mild (HT1)** – Conscious and shivering – Core temp 32–35°C
- **Moderate (HT2)** – Impaired consciousness, may or may not be shivering – Core temp 28–32°C
- **Severe (HT3)** – Unconscious, vital signs present – Core temp < 28°C
- **HT4** – Vital signs absent – Core temp < 24°C

Clinical features (cont.)



The hypothermic patient may additionally present with:

- Electrolyte abnormalities
- Hyper/hypoglycaemia
- Coagulation disorders
- 12-Lead ECG changes
 - Bradyarrhythmias
 - VF/asystole
 - Prolongation of PR, QRS and QT intervals
 - ST segment elevation
 - T wave inversion, Osborn J wave

+ Additional information

- Tympanic thermometers can be unreliable at low temperatures.
- SpO₂ should be monitored continuously however, pulse oximeter response times may be delayed.^[7]
- Manage treatable underlying conditions concurrently, (e.g. overdose, hypoglycaemia, seizure, trauma).
- Move hypothermic patients carefully and gently, as they are at an increased risk of developing VF due to impaired cardiac conduction.^[8]
- The severe/profound hypothermic patient must not be placed in a warm bath or shower as an increase in peripheral blood flow may result in significant hypotension and precipitate cardiovascular collapse.^[9]

- For patients with cardiac instability refractory to treatment, ambulance clinicians must contact the *QAS Clinical Consultation & Advice Line* to discuss management options.
- Consider tolerating sinus bradycardia if this is consistent with the patient's temperature.
- For hypothermic patients in cardiac arrest:
 - The lack of signs of life in a hypothermic patient cannot reliably be used for recording life extinct.
 - Good outcomes have been reported post prolonged resuscitation in hypothermic patients, therefore consider prolonged resuscitation and an increased threshold for transport to hospital until core temperature is close to normal.
 - Consider transfer to a hospital capable of Extra-corporeal warming (i.e. ECMO)^[10] for patients in hypothermic arrest or temperature < 28°C.
 - If PEA is the presenting rhythm and the patient's temperature is less than 30°C feel for a pulse for at least 60 seconds and consider EtCO₂/ultrasound to determine if there is any cardiac output, prior to commencing CPR as compressions can precipitate VF.^[10]
 - Withhold adrenaline (epinephrine) and other resuscitation drugs until the patient's temperature is approximately 30°C.^[10]
 - Between 30°C and 35°C drug intervals should be doubled.^[10]
 - Once the patient's temperature is greater than 35°C drug intervals should return to normal.^[10]
 - If the patient's temperature is less than 30°C and they are in VF/VT give up to three DCCS at maximum energy setting then withhold further DCCS until their temperature is greater than 30°C.

CPG: Clinician safety
CPG: Standard cares

Signs of life?

Manage as per:

- CPG: Resuscitation (age specific)
- CPG: Resuscitation - Special circumstances

- Place the patient in a warm environment (e.g. warmed vehicle)
- Remove all wet clothing
- Insulate with blankets
- Manage treatable conditions concurrently
- Continually monitor temperature

Consider:

- Oxygen
- 12-Lead ECG
- BGL
- Concentrating on core heating for patients with moderate to severe hypothermia
- Application of the BARRIER® EasyWarm® active self-warming blanket (see CPP: Other/Active self-warming blanket)
- Administration of warmed sodium chloride 0.9% to 38–42°C via the MEQU® Blood Warmer (see CPP: Drug and fluid administration/Blood warmer – MEQU®).

Note: Clinicians must only perform procedures for which they have received specific training and authorisation by the QAS.

Transport to hospital
Pre-notify as appropriate

