

# Inducing and maintaining normothermia using temperature modulation devices to improve outcomes after stroke or subarachnoid haemorrhage

Interventional procedures guidance

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[www.nice.org.uk/guidance/ipg701](https://www.nice.org.uk/guidance/ipg701)

## 1 Recommendations

- 1.1 Evidence on the safety and efficacy of inducing and maintaining normothermia using temperature modulation devices to improve outcomes after stroke or subarachnoid haemorrhage is inadequate in quality and quantity. Therefore, this procedure should only be used in the context of research. Find out [what only in research means on the NICE interventional procedures guidance page](#).

- 1.2 Further research should preferably be randomised controlled trials. It should report details of patient selection (including cause of fever, severity of stroke and neurological injury), method and duration of cooling, time from the neurological injury and onset of fever to starting cooling, complications related to the procedure and the device, neurological outcomes assessed using validated measures, and patient-reported outcomes (including quality of life) in the long term.

## 2 The condition, current treatments and procedure

### The condition

- 2.1 Stroke (ischaemic stroke and intracerebral haemorrhage) is an acute neurological event presumed to be vascular in origin and causing cerebral ischaemia, cerebral infarction or cerebral haemorrhage. Subarachnoid haemorrhage (SAH) is a haemorrhage from a cerebral blood vessel, aneurysm or vascular malformation into the subarachnoid space.
- 2.2 Both conditions can interrupt blood flow to the brain, damage brain cells and cause abnormalities of thermoregulation and an abnormally high body temperature (neurogenic fever). The abnormally high temperature may result in secondary neurological injury and is associated with worse outcomes, greater morbidity and mortality.

### Current treatments

- 2.3 Diagnosis and initial management of stroke is described in [NICE's guideline on stroke and transient ischaemic attack in over 16s](#). Current treatments for managing fever after stroke or SAH include identifying and treating a cause, antipyretic medications and standard physical methods of cooling such as fans and cooling blankets to lower body temperature.

## The procedure

- 2.4 In this procedure, a temperature modulation device is used to maintain the patient's core temperature within normal limits ( $37.0\pm0.5^{\circ}\text{C}$ ). Either surface techniques (such as heat exchange cooling pads) or internal techniques (such as an endovascular cooling device) may be used. Heat is exchanged between the patient and the device to allow the body temperature to be controlled to a pre-set point determined by the clinician.
- 2.5 This procedure aims to reduce brain injury and improve neurological outcomes after stroke or SAH by maintaining normothermia with precise temperature control.

## 3 Committee considerations

### The evidence

- 3.1 NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive literature search and detailed review of the evidence from 7 sources, which was discussed by the committee. The evidence included 1 randomised controlled trial, 3 non-randomised comparative studies and 3 case series. It is presented in the [summary of key evidence section in the interventional procedures overview](#). Other relevant literature is in the appendix of the overview.
- 3.2 The professional experts and the committee considered the key efficacy outcomes to be: improved quality of life, reduction in disability and neurological injury.
- 3.3 The professional experts and the committee considered the key safety outcomes to be: mortality, cardiovascular complications, worsening neurological outcomes, shivering and infection.
- 3.4 Patient commentary was sought but none was received.

## Committee comments

- 3.5 The committee noted that the evidence reviewed compared the use of special temperature modulation devices to achieve normothermia with conventional fever management, including antipyretic medications and standard cooling (such as surface cooling blankets).
- 3.6 The committee noted that the evidence reviewed showed many complications, but it was difficult to identify whether these were related to the neurological injury or the procedure.
- 3.7 The committee noted that there are various techniques used and that the safety profiles of the various techniques may be different.

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## Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).

## Accreditation

