

EARLY PEAK TEMPERATURE AND MORTALITY IN CRITICALLY ILL PATIENTS WITH ACUTE NEUROLOGICAL PATHOLOGY



THE GEORGE INSTITUTE
for Global Health

Manoj Saxena^{1,2}, Paul Young^{3,4}, Michael Bailey⁵, David Pilcher⁶, Richard Beasley^{3,4}, Rinaldo Bellomo⁵, Simon Finfer^{1,7}, John Myburgh^{1,2}

¹Division of Critical Care and Trauma, George Institute for Global Health, Sydney, New South Wales, Australia

²St George Clinical School, University of New South Wales, New South Wales, Australia

³Intensive Care Unit, Wellington Regional Hospital, Capital and Coast District Health Board, Wellington, New Zealand

⁴Medical Research Institute of New Zealand, Wellington, New Zealand

⁵Australian and New Zealand Intensive Care Research Centre, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

⁶Australian and New Zealand Intensive Care Society Centre for Outcome and Resource Evaluation, Melbourne, Victoria, Australia

⁷Sydney Medical School, University of Sydney, Sydney, New South Wales, Australia

Background

In the context of acute vascular and traumatic neurological pathology, the febrile response may be a marker of illness severity, or a modifiable risk factor for morbidity and mortality. However, in the context of infective neurological pathology, the febrile response may be linked to a protective host response to illness.

Hypothesis

Early fever has an independent association with worse outcome for vascular and traumatic neurological pathology, but may be protective for neurological infections.

Design + Setting + Participants

Retrospective cohort study using a database of Australian and New Zealand admissions from 129 ICUs (The Australia and New Zealand Intensive Care Society Centre for Outcomes and Resource Evaluation). Adult admissions between 2005 and 2010 were eligible for inclusion if their admission diagnosis was an APACHE III code for all forms of stroke (ischaemic and haemorrhagic stroke, including subarachnoid haemorrhage), traumatic brain injury, and, neurological infection.

Main Outcome Measures + Statistical Methods

The association between peak temperature in the first 24 hours after ICU admission and illness-severity adjusted in-hospital mortality, reporting odds ratios for risk of death relative to a normal temperature defined as 36.5 to 36.9°C.

Results

A total of 24,002 patients met the inclusion criteria and were available for analysis. The mean age of included patients was 52.4 (+/-20.5), APACHE II score 16.7 (+/-7.8) and median GCS 10 (IQR 5,14).

1. There was no increase or decrease in the risk of death with early peak body temperature (35.5 to 40°C) for patients with neurological infection (fig 1).
2. For patients with vascular and traumatic neurological pathology:
 - a) There was an increased risk of death below a peak temperature of 36.5 and above 39°C (fig 2).
 - b) Patients with a GCS < 8 had an increased hospital mortality below a peak temperature of 37 and above 38.5°C (fig 3).

Conclusion

1. The association between early peak temperature and in-hospital mortality is different in critically ill patients with neurological infection compared to patients with either vascular or traumatic pathology.
2. For patients with severe vascular and traumatic pathology, hospital mortality and risk of death do not change between an early peak temperature of 37 and 38.5°C.

*Odds ratios adjusted for illness severity using APACHE III predicted log odds risk of death with the temperature and GCS component removed.

Figure 1: Adjusted* odds ratios for in-hospital mortality versus peak temperature in the first 24 hours in ICU for patients with neurological infection.

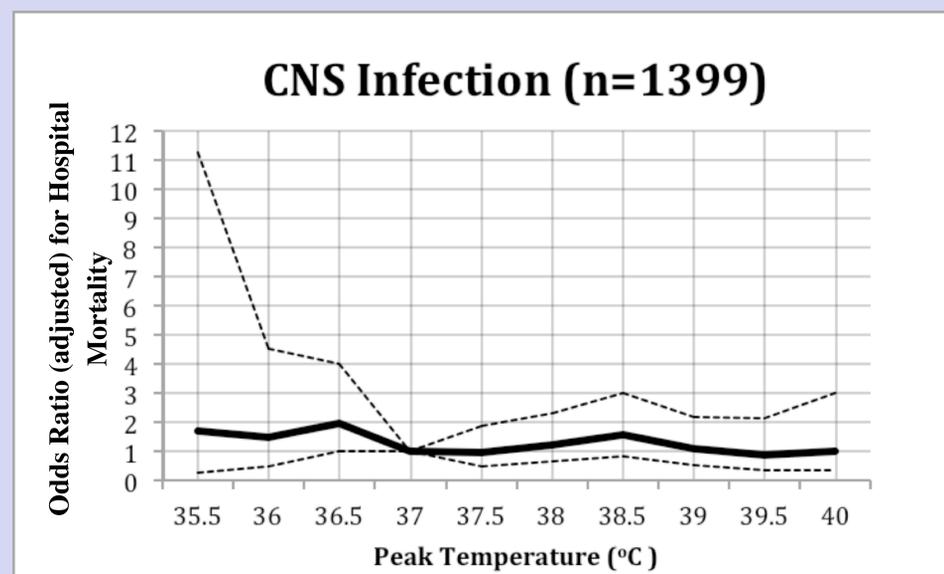


Figure 2: Adjusted* odds ratios for in-hospital mortality versus peak temperature in the first 24 hours in ICU for patients with vascular or traumatic neurological pathology.

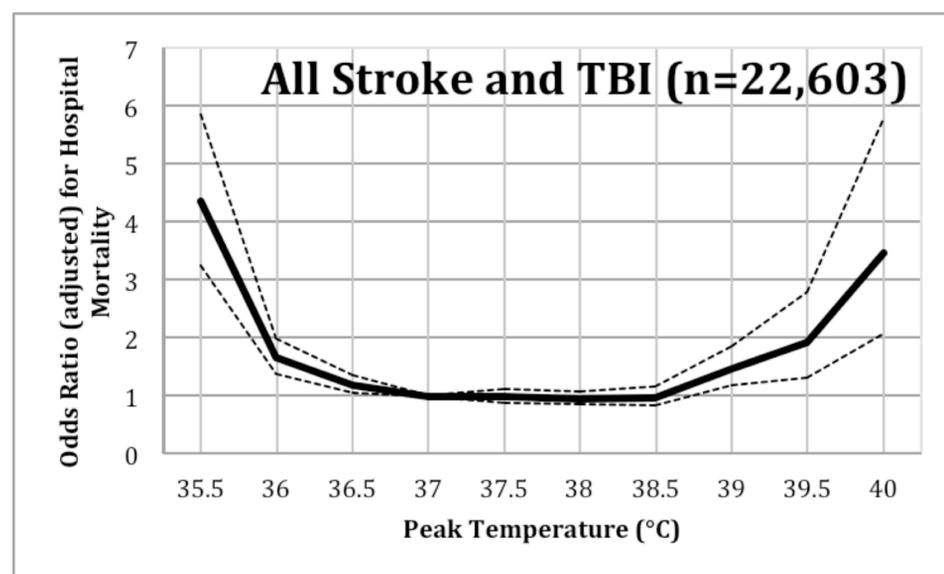


Figure 3: Unadjusted odds ratio for hospital mortality versus peak temperature in the first 24 hours of ICU for patients with all stroke/TBI separated into 3 subgroups based on pre-sedation Glasgow Coma Score.

