

Active Warming for Elective Caesarean Section: a randomised controlled trial



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3 years of departmental audit
10-45% of patients in obstetric theatres hypothermic.

Pre-warmed
IV fluids

NICE inadvertent perioperative hypothermia guidelines exclude obstetric patients

Enhanced
Recovery

Null hypothesis: There is no difference between the 1st post operative mean core temperature in patients who have had intraoperative active warming with forced air warming, conduction mattress warming or normal care.

Forced air
warming

Fluid loss

Conduction
mattresses

Exposure

Shivering

Inline fluid warming

Pre warmed fluids &
inline warming 8 studies
in obstetric patients

CMACE recommends
following NICE guidelines to
reduce risk of infection

Inadvertent perioperative hypothermia associated with shivering, increased risk of cardiac events, increased bleeding, higher infection rates and delayed recovery.

Methods

Pre-operative

- Patient informed about study in pre-operative assessment
- Day of surgery; Consented and eligibility checked
- Baseline temperature (oral) & thermal comfort score in theatre waiting room
- Randomised

Intra-operative

- Standard spinal anaesthetic
- **Normal Care (control group)**; enflow warmed fluids only
- **Forced Air Warming**: enflow warmed fluids + full length underbody bair hugger
- **Conduction Mattress**: enflow warmed fluids + inditherm conduction mattress
- 15 minute temperature and thermal comfort scoring

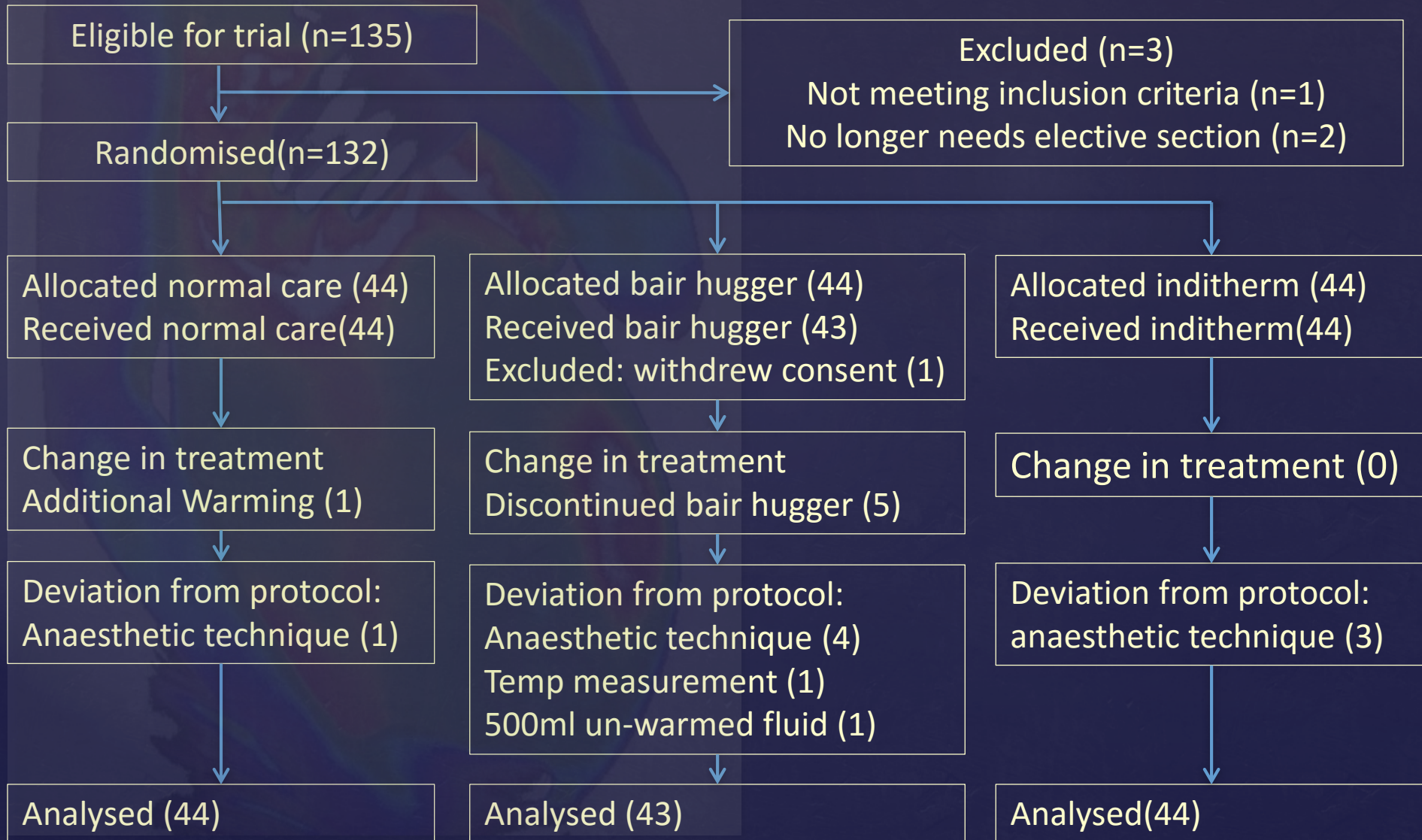
Post-operative

- 15 minute temperature and thermal comfort scoring
- Neonatal data recorded

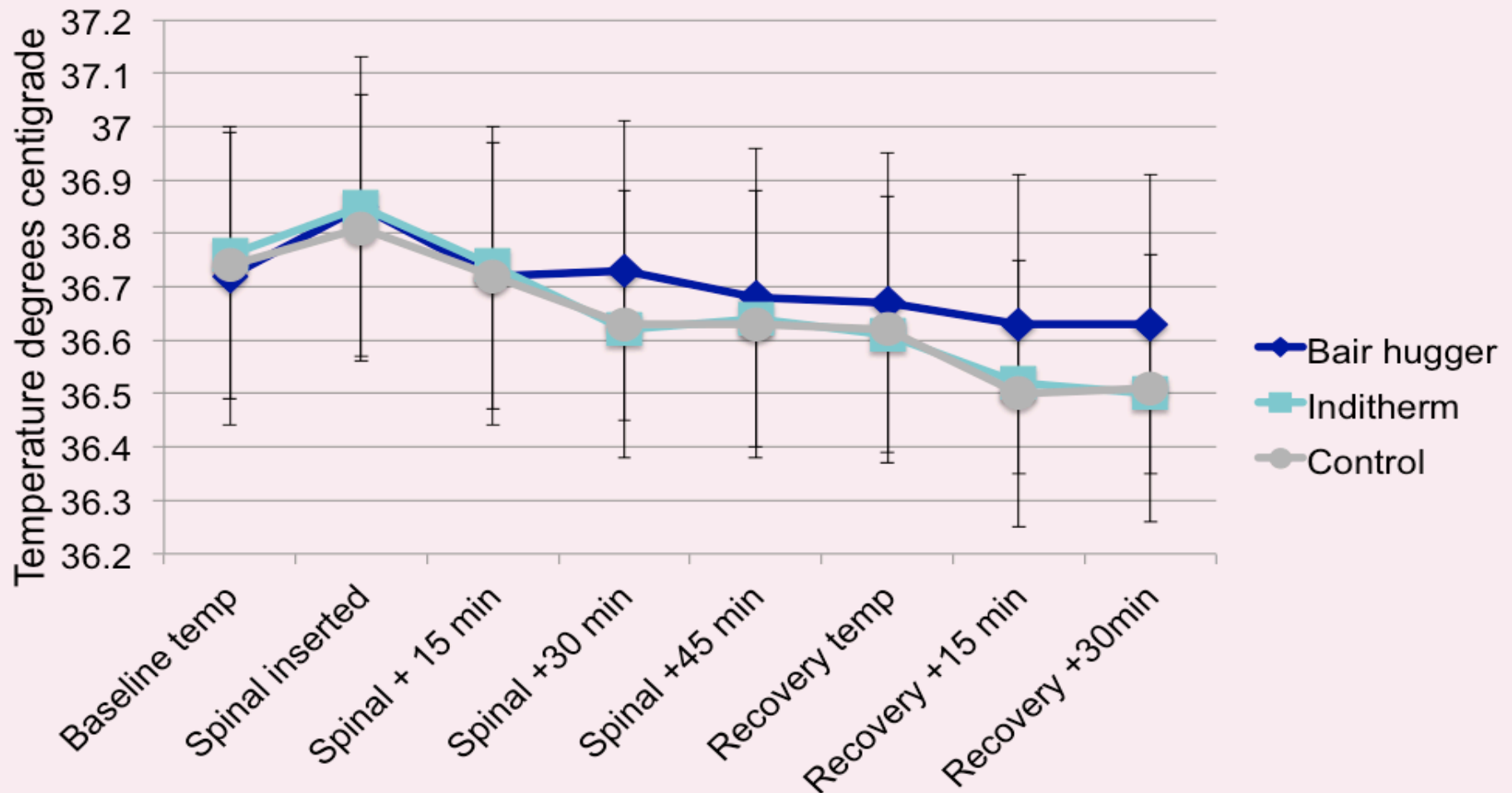
Data Analysis

- Primary outcome, ANOVA with Bonferroni adjustment for multiple group testing
Secondary outcomes, statistical testing according to data type

Consort Diagram



Results



Mean temperatures at baseline and then 15 minute intervals peri-operatively

Results

Primary Outcome

- Temperature on arrival in recovery: no significant difference (NSD) observed between the 3 groups (P=0.74)

Secondary Outcomes

- Small difference in temperature at recovery + 15 min
 - force air warming and control group (P=0.01)
 - forced air warming and inditherm group (P=0.02)
- No episodes of hypothermia at any point
- Ashrae thermal comfort score: NSD at any point
- Neonatal temperatures: NSD
- Infection Rates: rates very low and NSD
- Effect on estimated blood loss, Hb drop and transfusion: NSD
- Time until meets recovery discharge criteria: NSD
- Length of stay post op: NSD

Discussion

- What does this mean for everyday practice?
- It is possible to avoid inadvertent perioperative hypothermia in elective caesarean section patients
- No hypothermia in the trial patients versus 2015 audit data where 44% of of elective c-section patients were hypothermic
- What is different between trial patients and audit patients?
 - ASA 1 and 2 patients versus all patients
 - oral temperature measurement method versus tympanic
 - fluid warming at point of delivery (enflow) versus pre-warmed fluid
- The further removed the trial population and trial methods are from normal practice, the less applicable the results are to everyday practice.