



Perioperative Hypothermia during Elective Spine Surgery under General Anaesthesia in a Ghanaian Teaching Hospital: Comparison of Routine Thermal Care and a Pre-warming Thermal Care Bundle

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Background

- Inadvertent perioperative hypothermia (core temperature < 36°C) is a common consequence of anaesthesia.^{1,2}
- Complications associated with IPH are well documented. Current hypothermia prevention strategies during spine surgery at KBTH involves only intraoperative forced-air warming and the incidence of IPH with this strategy has not been studied.
- Preoperative cutaneous warming using forced-air (prewarming) for only 30 minutes averts redistribution hypothermia attributable to anaesthesia-induced peripheral vasodilatation.³

Objectives

Main objective: To determine the effectiveness of prewarming plus active intraoperative warming compared to intraoperative forced-air warming alone in preventing IPH during spine surgery at Korle-Bu Teaching Hospital.

Specific objectives: To compare between the 2 study arms:

- Intraoperative core body temperatures and the change in core body temperature from baseline at specific time periods post-induction.
- The incidence of IPH.
- Pre-induction patient thermal comfort and the incidence of postoperative shivering in PACU.

Results

Participant Characteristic	Study Group		Overall n (%)	p-value
	Intervention(n=16) n (%)	Control(n=16) n (%)		
Age (years) (Mean ± SD)	48.44 ± 18.68	50.81 ± 14.00	49.63 ± 16.28	0.687
Sex				
Female	7 (43.75)	8 (50.00)	15 (46.88)	1.000
Male	9 (56.25)	8 (50.00)	17 (53.12)	
BMI (Kg/m ²) (Mean ± SD)	25.80 ± 4.35	26.22 ± 4.54	26.01 ± 4.38	0.794
Under-weight	0 (0.00)	1 (6.25)	1 (3.13)	
Normal	6 (37.50)	5 (31.25)	11 (34.38)	1.000
Overweight	7 (43.75)	6 (37.50)	13 (40.63)	
Obese	3 (18.75)	4 (25.00)	7 (21.88)	
Indication for Surgery				0.8921
Cervical Spine Degenerative	3 (18.75)	2 (12.50)	5 (15.63)	
Cervical Spine Malignancy	2 (12.50)	1 (6.25)	3 (9.38)	
Cervical Spine Trauma	2 (12.50)	2 (12.50)	4 (12.50)	
Cervical & Lumbar Degenerative	0 (0.00)	1 (6.25)	1 (3.13)	
Lumbar Spine Degenerative	5 (31.25)	8 (50.00)	13 (40.63)	
Lumbar Spine Trauma	2 (12.50)	1 (6.25)	3 (9.38)	
Thoracic Spine Degenerative	0 (0.00)	1 (6.25)	1 (3.13)	
Thoracic Spine Malignancy	1 (6.25)	0 (0.00)	1 (3.13)	
Thoracic Spine Trauma	1 (6.25)	0 (0.00)	1 (3.13)	
ASA Class				1.000
1	5 (31.25)	5 (31.25)	10 (31.25)	
2	11 (68.75)	11 (68.75)	22 (68.75)	

Key: SD - Standard deviation; kg - kilograms; m - metres; kg/m² - kilogram per square metre; % - Column percentage, i - P-value obtained from a Fishers' Exact test.

- Intraoperative core body temperature in the intervention group averaged over time was significantly higher than in the control group.
- A 0.56°C drop in temperature was observed with the intervention at 45 and 60 minutes compared to a 0.83°C and 0.81°C drop in the controls.
- Cumulative incidence of IPH was 0 in the intervention group compared to 50% in the controls.
- Intervention group had better preoperative thermal comfort and lower postoperative shivering occurrence.

Change in intraoperative core body temperature from baseline at Specific intraoperative time periods

Time (Minutes)	N	Intervention Mean ± SD °C	Control Mean ± SD °C	Difference Mean	p-value
15	32	-0.28 ± 0.29	-0.49 ± 0.35	0.22	0.064
30	32	-0.48 ± 0.34	-0.75 ± 0.34	0.28	0.029
45	32	-0.56 ± 0.39	-0.83 ± 0.38	0.26	0.060
60	32	-0.56 ± 0.32	-0.81 ± 0.42	0.25	0.070
75	32	-0.47 ± 0.31	-0.73 ± 0.40	0.26	0.047
90	32	-0.39 ± 0.32	-0.69 ± 0.42	0.30	0.030
120	32	-0.21 ± 0.31	-0.49 ± 0.39	0.29	0.029
150	29	-0.09 ± 0.35	-0.34 ± 0.41	0.25	0.092
180	23	0.03 ± 0.43	-0.19 ± 0.44	0.22	0.241
210	20	0.17 ± 0.44	-0.09 ± 0.42	0.26	0.189

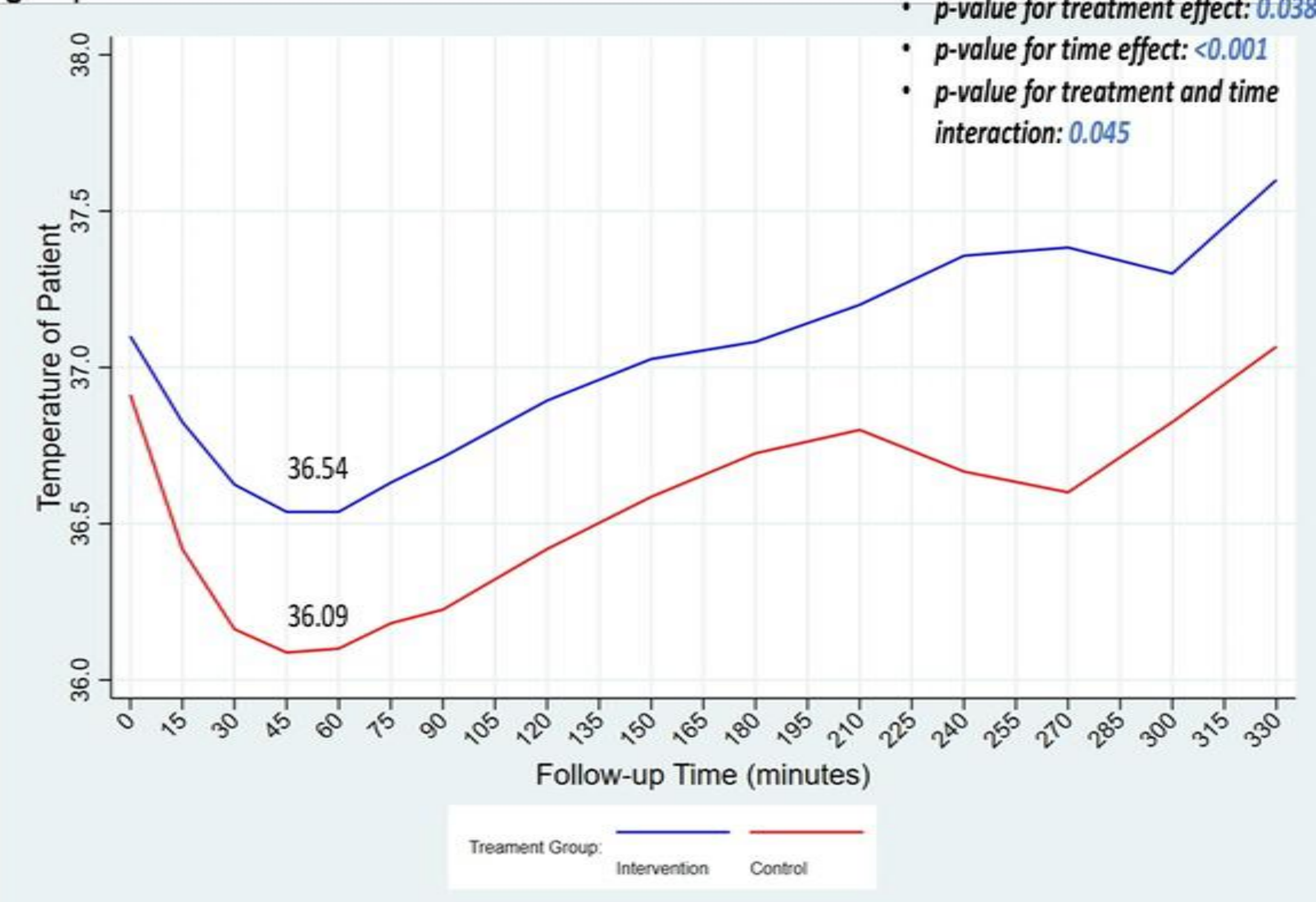
Methods

- Study was a **prospective, randomized controlled trial**.
- Study recruited ASA I to III clients 18 years plus having elective spine procedure with estimated anaesthesia duration > 3 hours.
- 32 clients** were consecutively selected into the study and simple randomization (balloting without replacement) was used to assign them to Intervention or Control group, with **16 participants each**.

Procedures Applied to Study Groups		
	Intervention Group	Control Group
Preoperative Period	•Holding area ambient temperature was maintained above 23°C. •Core body temperature of all participants was checked with an infrared tympanic thermometer. •Wore a cotton hospital gown and received preoperative forced-air warming(prewarming) via a full body blanket covered with a cotton hospital sheet for ~40 minutes at 43°C.	•Holding area ambient temperature was maintained above 23°C. •Core body temperature of all participants was checked with an infrared tympanic thermometer. •Received routine institutional preoperative warming – a cotton hospital gown covered with a single cotton sheet.
Intraoperative period	•Operating room ambient temperature was maintained at 22-23°C. •Immediate preinduction core body temperature was measured with an infrared tympanic thermometer (baseline core body temperature) Standardised GA+ETT •Oesophageal temperature probe was inserted up to a depth of 30cm from the patient's incisors. •In-line IV fluid warming to 37°C and Forced-air Warming	•Operating room ambient temperature was maintained at 22-23°C. •Immediate preinduction core body temperature was measured with an infrared tympanic thermometer (baseline core body temperature) Standardised GA+ETT •Oesophageal temperature probe was inserted up to a depth of 30cm from the patient's incisors. •Forced-air warming only
Postoperative period	•All patients had their tympanic membrane temperature measured on arrival at the post anaesthesia care unit (PACU). •Observed for the occurrence of shivering in PACU.	

Core temperature, heart rate and blood pressure measurements were recorded at regular intervals. Thermal comfort of the participants in both groups was assessed before induction of anaesthesia using a visual analog scale.

Trend of intraoperative core body temperature post-induction in the study groups



Discussion and Conclusion

30-40 minutes of prewarming combined with active intraoperative warming increased perioperative core body temperature and decreased the incidence of IPH in adult patients having spine surgery under general anaesthesia compared to intraoperative forced-air warming alone.

References

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