Room vs. Body Temperature 4% Albumin Fluid Bolus after Cardiac Surgery: Early Data

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Background

- Room temperature fluid bolus therapy (FBT) is widely used after cardiac surgery. [1]

- Little is known the effects of FBT with warm 4% albumin (heating cartridge at between 37 and 40℃).

1 J Intern Med 277:58-68, 2014

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Objective

- To compare key hemodynamic and temperature effects of warm 4% albumin FBT with room temperature 4% albumin FBT.

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Study Design

- Single-centre prospective before-and-after sequential comparative study.
- Decision to deliver fluid bolus was made by treating clinicians.
- Monitoring and data collection was by independent investigators.

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Patients

- Inclusion criteria
  - ✓Age > 20
  - ✓On-pump cardiac surgery
  - ✓S-G catheter
  - ✓Intubated
  - ✓Need fluid bolus

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Patients

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  - ✓Age > 20
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  - ✓Need fluid bolus

- Exclusion criteria
  - ✓Any change of vasoactive drugs or sedatives
  - ✓Any change of MV
  - ✓Any change of pacing
  - ✓A-V shunt for chronic HD
  - ✓IABP
  - ✓VA-ECMO

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Intervention

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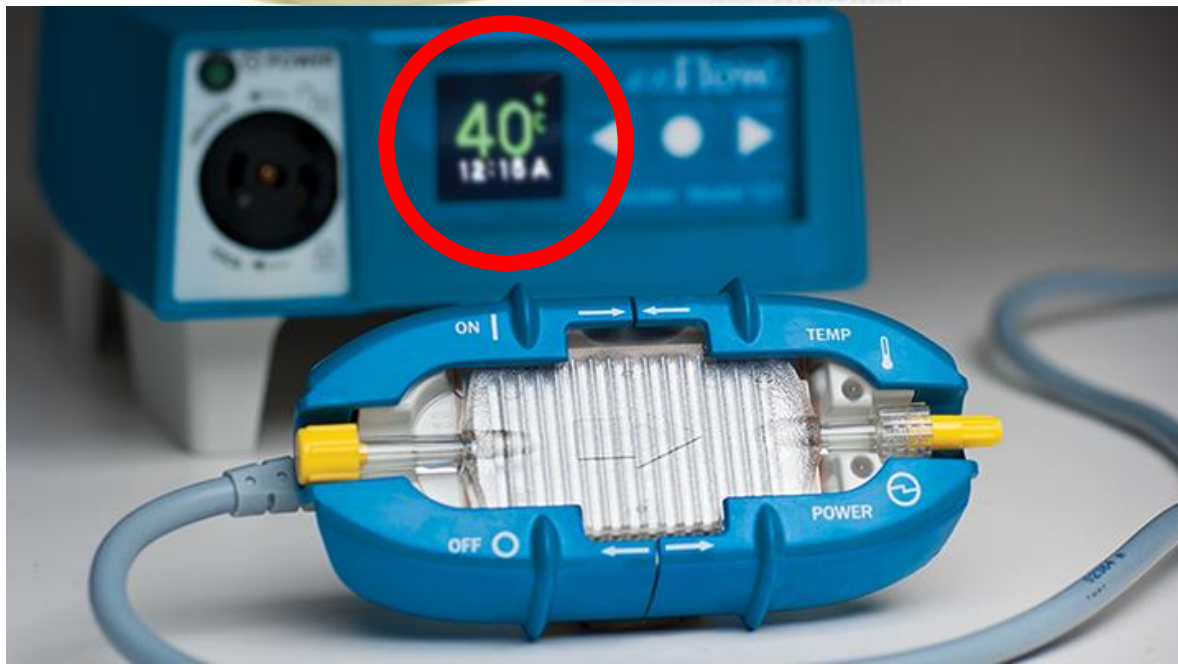
Intervention

VS



Measurements

- All patients were monitored using Philips Intellivue MP 70.
- Data were recorded for 30mins after the end the bolus.
- BP, CVP, PAP, HR, SpO2 and body temperature (BT) data were recorded.
- CI was measured using thermodilution before, 0, 15 and 30 min after the bolus.
- BT was measured by S-G catheter.

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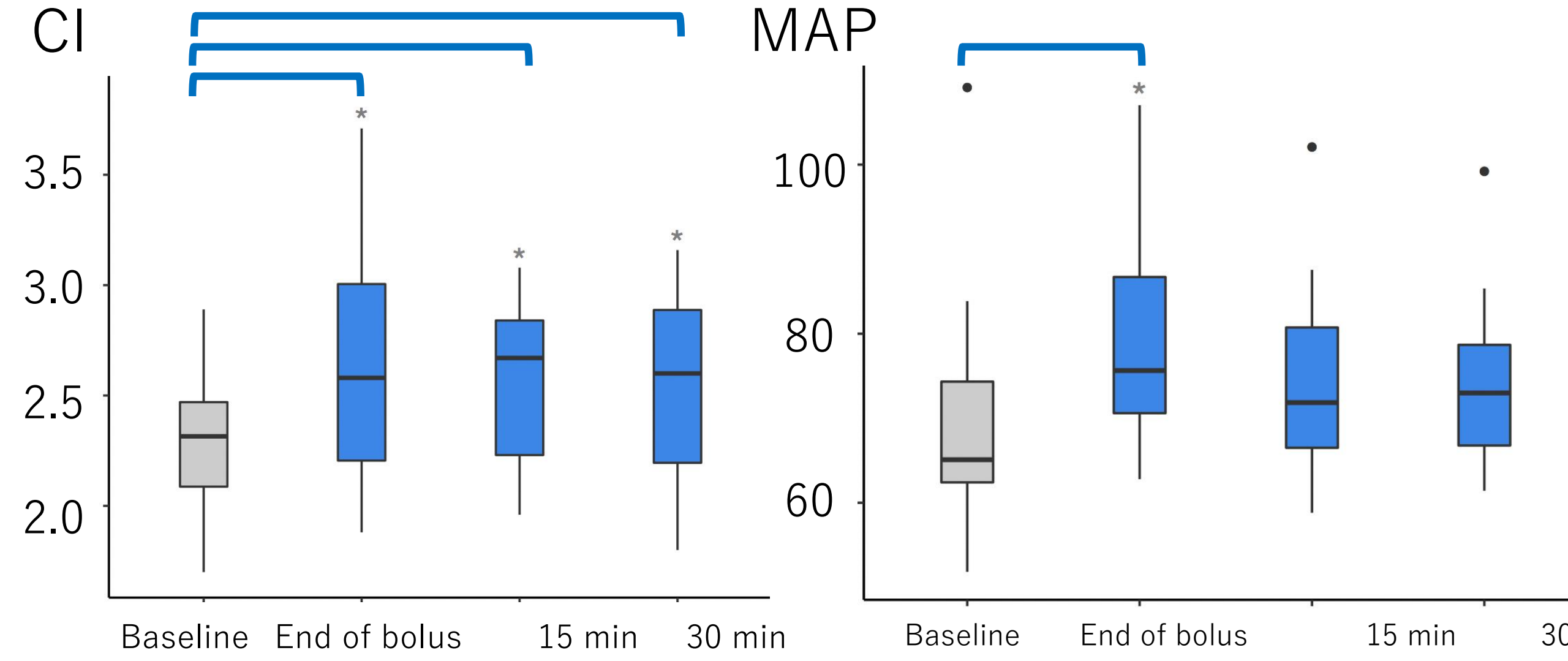
Baseline characteristics

Variables	Room temperature Albumin N = 16	Warm Albumin N = 12	p value
Age (years)	67.5 [62.8; 70.2]	70.0 [59.5; 72.5]	0.99
Gender (male)	13 (81%)	10 (83%)	0.99
Body mass index (kg/m^2)	30.6 [28.1; 34.8]	27.1 [25.7; 28.9]	0.11
APACHE III score	48 [41.5; 60.8]	39 [29.8; 45.2]	0.04
Type of surgery			
On-pump CABG	9 (56%)	8 (67%)	0.58
Valve	3 (19%)	3 (25%)	-
Both	4 (25%)	1 (8%)	-
CPB duration (min)	135 [111; 168]	94 [83; 100]	<0.01
Aorta clamp duration (min)	107 [93; 124]	69 [67; 75]	<0.01
Post-CPB TEE assessment			
LV dysfunction	3 (23%)	1 (8%)	0.59
RV dysfunction	2 (15%)	1 (8%)	0.99

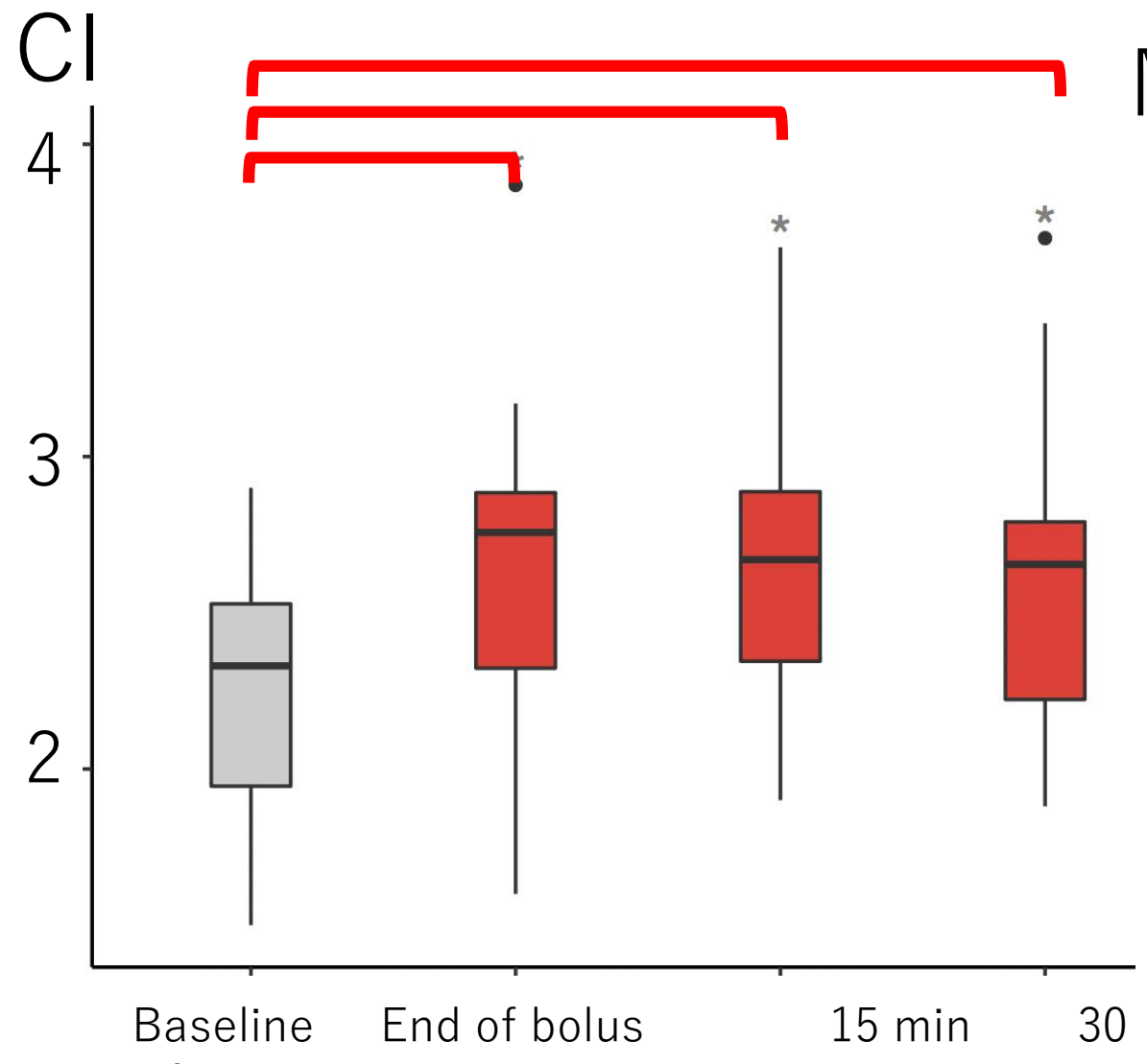
Baseline characteristics

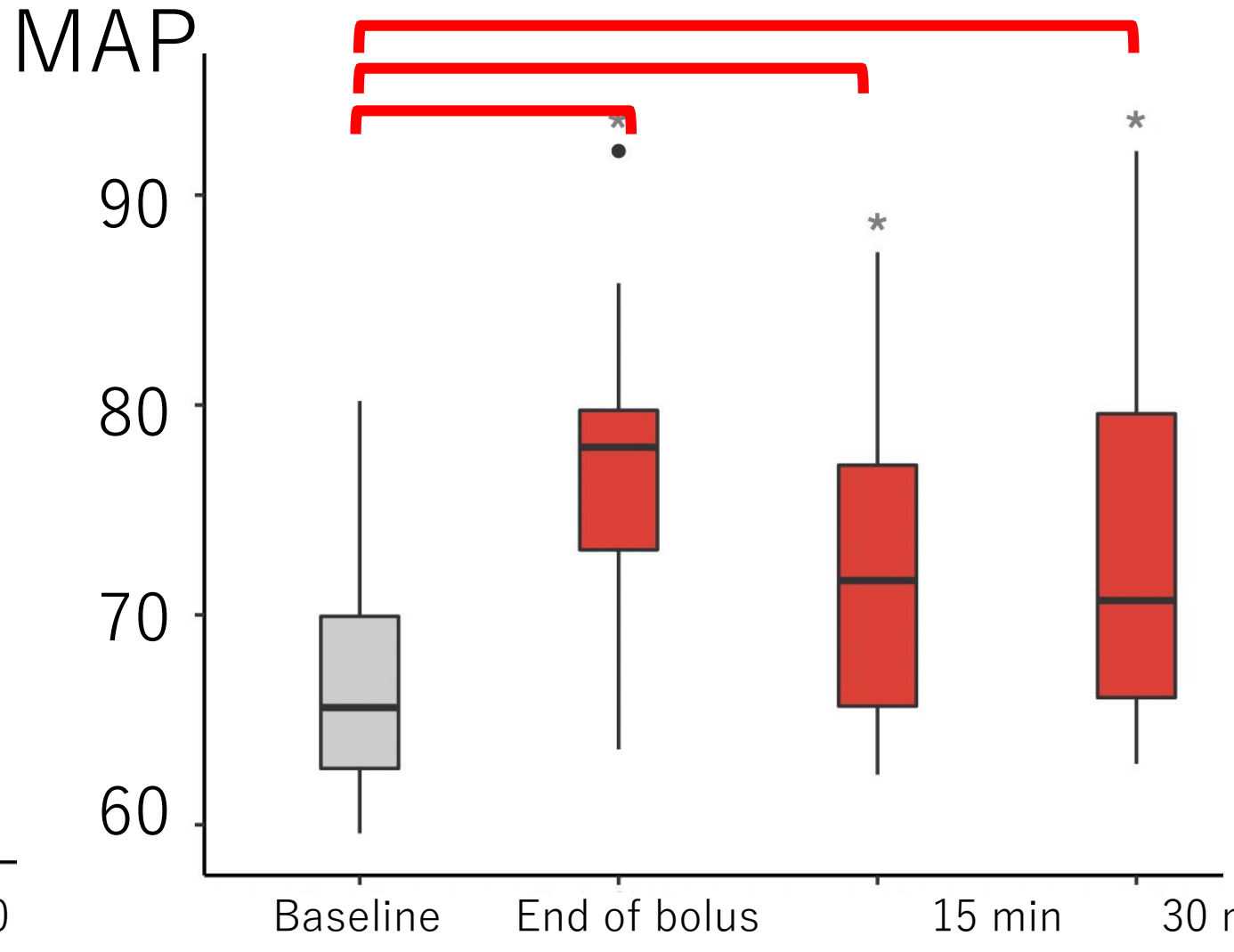
	Room temperature Albumin N = 16	Warmed Albumin N = 12	p value
Body temperature control			
Blood temperature (° C)	36.6 [36.2; 36.9]	36.8 [36; 36.9]	0.61
External body active warming	4 (25%)	1 (8%)	0.36
Hemodynamic status			
Vasopressor support	5 (31%)	4 (33%)	0.99
Milrinone	6 (38%)	0 (0%)	0.02
Milrinone dose (µg/kg/min)	0 [0; 0.14]	0 [0; 0]	0.02
Sedative drugs			
Propofol	16 (100%)	11 (92%)	0.43
Propofol dose (mg/h)	100 [100; 150]	100 [50; 112.5]	0.17
Opioids	2 (12%)	1 (8%)	0.99
Morphine dose (mg/h)	0 [0; 0]	0 [0; 0]	0.43
Fentanyl dose (µg/h)	0 [0; 0]	0 [0; 0]	0.88
Duration of Alb infusion (min)	9.3 [6.0; 14.0]	4.5 [4.0; 5.3]	<0.01

Effects of a room temperature 4% Albumin fluid bolus

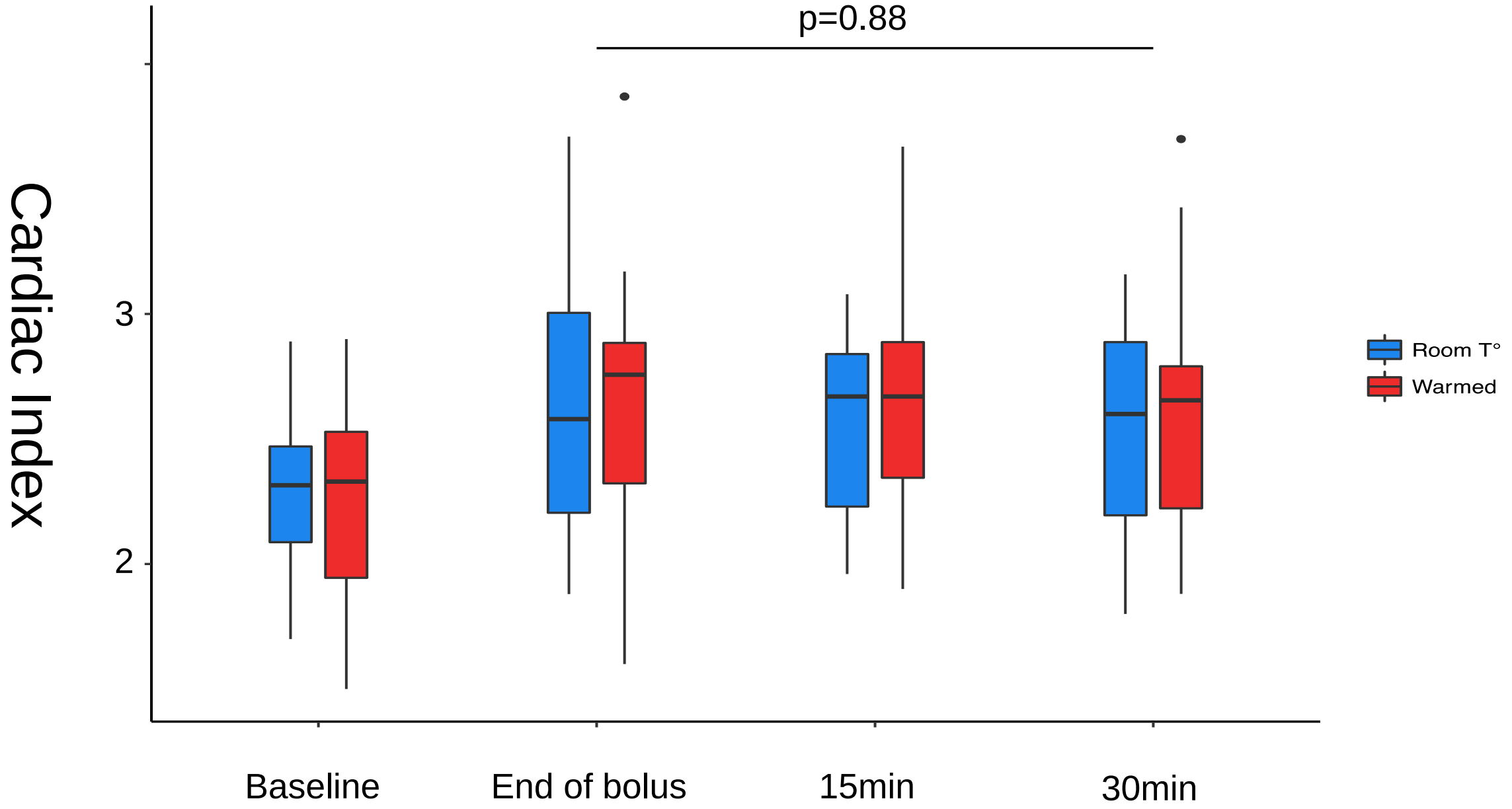


Effects of a warm 4% albumin fluid bolus.

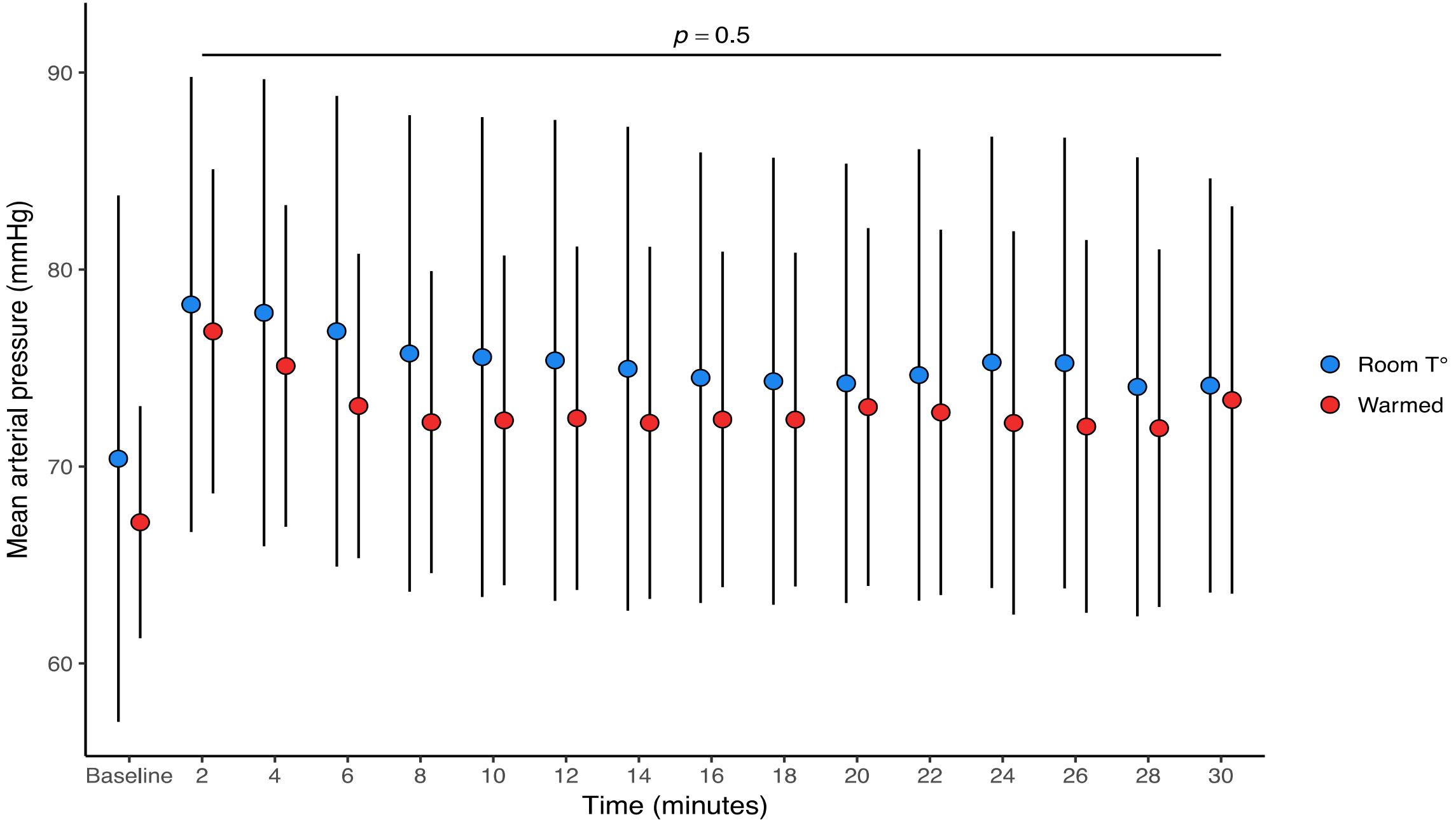




Cardiac index at baseline and after fluid bolus



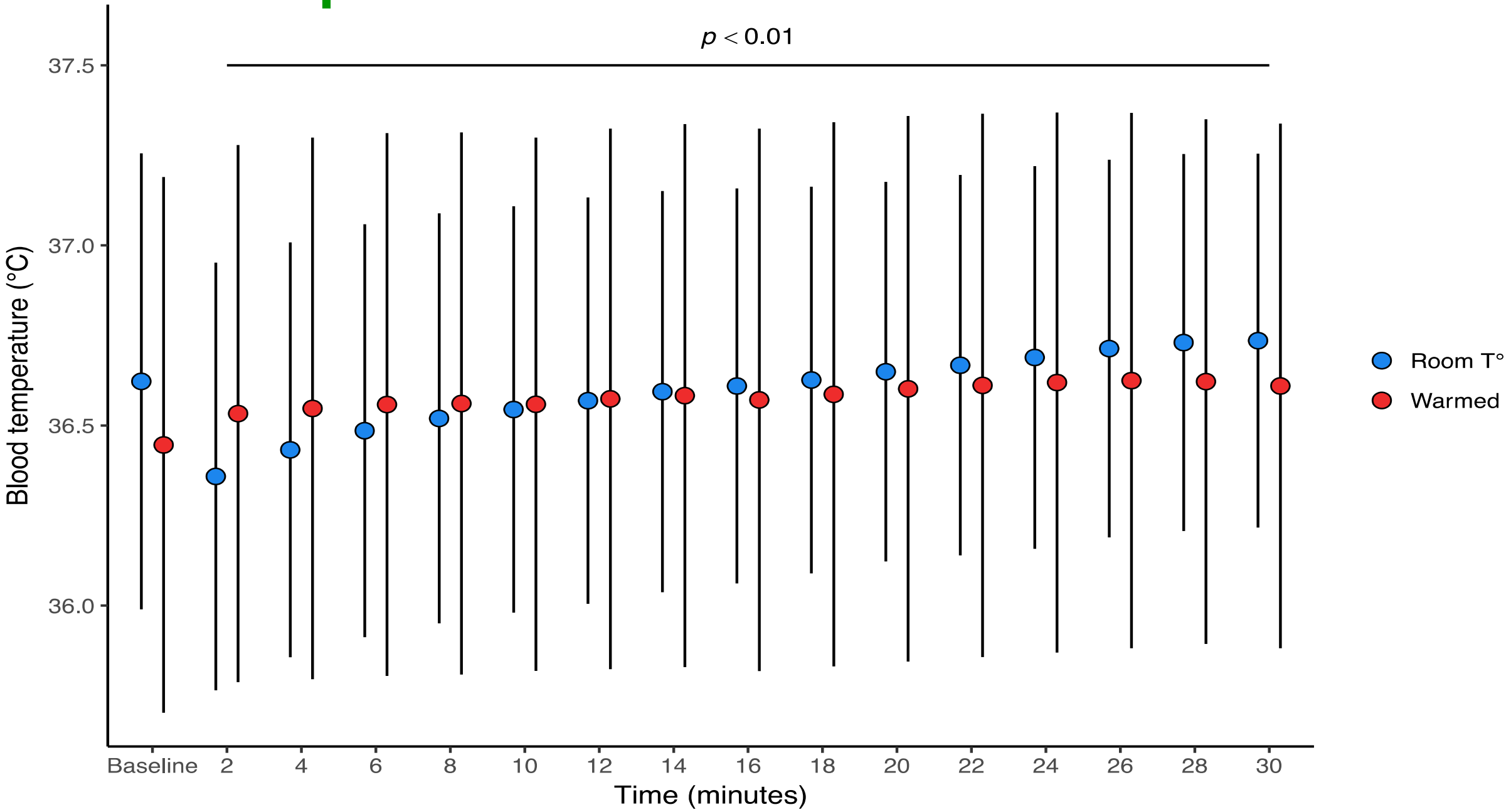
Mean arterial pressure at baseline and after fluid bolus



Assessment of hemodynamic response dissipation

	Room temperature Albumin	Warmed Albumin	p value
Early CI responders *(ΔCI>15%)*	N = 8†	N = 7	
Absence of dissipation (*ΔCI>10%)*)	5 (62%)	5 (71%)	0.99
Early MAP responders *(ΔMAP>10%)*	N = 7	N = 7	
Absence of dissipation (*Baseline MAP + 3*)	4 (57%)	4 (57%)	0.99

Blood temperature at baseline and after fluid bolus



Discussion

- Room temperature 4% Albumin bolus resulted in relative hypothermia with a 0.3℃ decrease which took approximately 10-15 minutes to return to baseline.
- Warm Albumin resulted in faster infusion.
- Warm Albumin prevented infusion associated hypothermia.

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Discussion

- 500 ml of 4% albumin increased cardiac index by b/w 0.3 and 0.5 L/min/m2 with the effect lasting to 30 minutes.
- 500 ml of 4% albumin increased MAP by b/w 5 and 8 mmHg with the effect lasting to 30 minutes.
- No difference in hemodynamic variables between warm vs. cold albumin.

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Discussion

- However, small sample size so far – only early data.
- Baseline differences between the two groups could not be adjusted for due to small numbers.
- Limited power to see small differences.

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Conclusion

- Warming 4% Albumin may prevent relative hypothermia and read to faster bolus administration.
- However, hemodynamic variables did not show any difference.
- More data acquisition from more patients needed to increase power to see differences, if present.

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